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F14A SYSTEM SAFETY PROGRAM PLAN

EG&G Washington Analytical Services Center, Inc.
2450 Alamo SE
Albuquerque, New Mexico 87106

3 September 1981

Final Report for Period 4 May 1981—3 September 1981

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This document, System Safety Program Plan, is the implementing document covering the safety aspects of performing an EMP test on the F14 aircraft in the HPD, VPD, and NWEF at Kirtland AFB, NM.

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PREFACE

This is the Safety Program Plan for the F-14 EMP Test Program activities to be performed at the Horizontally Polarized Dipole (HPD), the Vertically Polarized Dipole (VPD-II). Both facilities are located on Kirtland Air Force Base in Albuquerque, New Mexico.

Conversion factors for U.S. customary to metric (SI) units of measurement.

To Convert From	To	Multiply By
angstrom	meters (m)	1.000 000 X E -10
atmosphere (normal)	kilo pascal (kPa)	1.013 25 X E +2
bar	kilo pascal (kPa)	1.000 000 X E +2
barn	meter^2 (m^2)	1.000 000 X E -28
British thermal unit (thermochemical)	joule (J)	1.054 350 X E +3
cal (thermochemical)/cm^2§	mega joule/m^2 (MJ/m^2)	4.184 000 X E -2
calorie (thermochemical)§	joule (J)	4.184 000
calorie (thermochemical)/g§	joule per kilogram (J/kg)*	4.184 000 X E +3
curie§	giga becquerel (GBq)†	3.700 000 X E +1
degree Celsius‡	degree kelvin (K)	$t_K = t°_C + 273.15$
degree (angle)	radian (rad)	1.745 329 X E -2
degree Fahrenheit	degree kelvin (K)	$t_K = (t°_F + 459.67)/1.8$
electron volt§	joule (J)	1.602 19 X E -19
erg§	joule (J)	1.000 000 X E -7
erg/second	watt (W)	1.000 000 X E -7
foot	meter (m)	3.048 000 X E -1
foot-pound-force	joule (J)	1.355 818
gallon (U.S. liquid)	meter^3 (m^3)	3.785 412 X E -3
inch	meter (m)	2.540 000 X E -2
jerk	joule (J)	1.000 000 X E +9
joule/kilogram (J/kg) (radiation dose absorbed)§	gray (Gy)*	1.000 000
kilotons§	terajoules	4.183
kip (1000 lbf)	newton (N)	4.448 222 X E +3
kip/inch^2 (ksi)	kilo pascal (kPa)	6.894 757 X E +3
ktap	newton-second/m^2 ($N-s/m^2$)	1.000 000 X E +2
micron	meter (m)	1.000 000 X E -6
mil	meter (m)	2.540 000 X E -5
mile (international)	meter (m)	1.609 344 X E +3
ounce	kilogram (kg)	2.834 952 X E -2
pound-force (lbf avoirdupois)	newton (N)	4.448 222
pound-force inch	newton-meter (N•m)	1.129 848 X E -1
pound-force/inch	newton/meter (N/m)	1.751 268 X E +2
pound-force/foot^2	kilo pascal (kPa)	4.788 026 X E -2
pound-force/inch^2 (psi)	kilo pascal (kPa)	6.894 757
pound-mass (lbm avoirdupois)	kilogram (kg)	4.535 924 X E -1
pound-mass-foot^2 (moment of inertia)	kilogram-meter^2 ($kg•m^2$)	4.214 011 X E -2
pound-mass/foot^3	kilogram-meter^3 (kg/m^3)	1.601 846 X E +1
rad (radiation dose absorbed)§	gray (Gy)*	1.000 000 X E -2
roentgen§	coulomb/kilogram (C/kg)	2.579 760 X E -4
shake	second (s)	1.000 000 X E -8
slug	kilogram (kg)	1.459 390 X E +1
torr (mm Hg, 0° C)	kilo pascal (kPa)	1.333 22 X E -1

*The gray (Gy) is the accepted SI unit equivalent to the energy imparted by ionizing radiation to a mass of energy corresponding to one joule/kilogram.
†The becquerel (Bq) is the SI unit of radioactivity; 1 Bq = 1 event/s.
‡Temperature may be reported in degree Celsius as well as degree kelvin.
§These units should not be converted in DNA technical reports; however, a parenthetical conversion is permitted at the author's discretion.

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SECTION 1

INTRODUCTION

Safety is the primary concern in any experimental effort. Test operations performed in a hazardous manner can result in loss of life or injury to personnel. Inattention to safety can also result in damage to equipment, compromising completion of the required experimental tasks.

This document addresses the safety aspect of performing an Electromagnetic Pulse (EMP) test on an F-14 Aircraft in the HPD and VPD-II facilities at Kirtland Air Force Base (KAFB). The safety aspects of this test can be divided into t categories. The first category embraces those elements wh are common to the class of tests, facilities, environment, et which have been encountered previously. Safety measures a procedures exist for this class of hazard. The second categor encompasses those hazards which are unique to this test effort, and therefore have not been encountered previously.

This document will not reanalyze those hazards which fall into the first category. They will be identified and the existing procedures and equipment employed to counteract those potential hazards will be cited.

In the area of safety problems and hazards which are unique to this test program, a hazard analysis in accordance with Reference 1 (discussed in detail in Section 5 of this document) will be performed and recommended solutions will be derived.

In the process of analyzing the test operations to identify hazards, and to determine solutions to control these hazards, it is necessary to distinguish between hazards which can be eliminated and inherent hazards. For hazards which can be eliminated, the necessary steps will be taken to rectify the hazardous conditions. In the case of inherent hazards, the corrective actions and/or procedures will be directed towards:

a. Reducing the hazardous conditions as much as possible.

b. Minimizing personnel exposure to the hazard.

c. Insuring that the safety measures are adhered to at all times.

Figure 1 depicts the relationship of the Test Program Safety Plan with other F-14 documents. Safety requirements derived from the safety and hazards analyses will be inserted into the appropriate test procedures for implementation as shown in the figure.

Section 2 of this document is a background section to familiarize the reader with the F-14 Assessment Program, its objectives, the test facilities and the assumptions concerning the implementation of this test effort. The assumptions stated are those which are pertinent to the safety analysis.

Section 3 gives a brief description of the HPD and VPD-II Test Facility.

Section 4 lists the sources used to establish the safety requirements.

Section 5 contains the safety and hazard analyses.

Section 6 presents the safety program for the F-14 Assessment Program in HPD and VPD II.

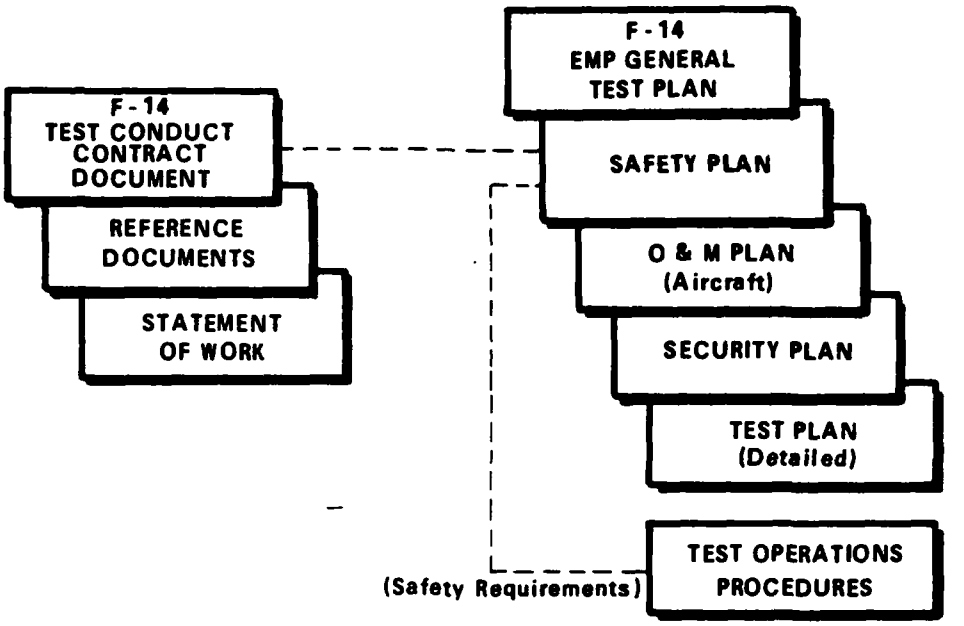


Figure 1. Test Program Safety Plan Relationships

SECTION 2

BACKGROUND

2-1 PROGRAM OVERVIEW

The F-14 EMP test is designed to be the primary source of empirical data and, as such, is an integral portion of the overall EMP assessment program for the F-14 system. The purpose of this test is to provide sufficient test data and evaluation for subsequent incorporation into the overall EMP program.

Test data used in the assessment to validate or supplement analytic data, or to calculate parameter values, will be obtained from approximately four months of testing on an F-14 at the HPD and VPD II test facilities. Testing will enhance the understanding of the aircraft EMP response mechanisms, e.g., dominant Points of Entry (POE), major cable coupling paths, wire current distributions and variability. Detailed test planning will precede the tests to assure smooth and safe test operations, to assure that all data needed for the program are obtained, and to assure that test procedures lead to valid data. Hazards analysis by the Analysis contractor will identify all boxes that might be damaged during test.

Pre-test analysis will facilitate damage analysis, test planning and testing, and provide analysis inputs by calculating thresholds for damage screens.

2-2 TEST OBJECTIVES

We have established a set of test objectives which we feel will produce the quantity and quality of data required to

support the overall program objectives. In general terms, the test objectives are:

a. Obtain the quantity and quality of data needed to produce an accurate evaluation of the EMP susceptibility of the F-14 aircraft, and make hardening recommendations.

b. Develop the technology and EMP test expertise to conduct the F-14 and subsequent Navy tactical aircraft system-level evaluations in the most effective and efficient manner possible.

2-3 APPROACH

The approach to this test program has been to structure a series of tests, each with a specific technical objective, to be performed using the F-14 as the test vehicle. The primary criterion in the selection and prioritization of tests is to evaluate the effect of EMP on the F-14 aircraft. Having selected these tests, a series of test requirements has been derived. Based on the objectives and the requirements, a sequence for testing in the HPD evolved. This Safety Analysis concerns itself with executing the planned tests in a safe manner. It thus draws on the information derived from the objectives and requirements (orientations, configurations, etc.) to determine those activities which are hazardous, and to develop procedures, equipment, etc., which will eliminate or control test hazards.

2-4 ASSUMPTIONS

In order to develop an analysis for safety, identify hazards, and identify potential solutions to these hazards, it

is necessary to have a large amount of detailed information concerning the manner in which the test program is to be implemented. In this regard, there are basically two choices, delay performing a safety analysis until such time as all of the required information is available, or postulate, based on the best available information, those conditions, factors, etc., which have to be defined in order to perform the safety analysis. The second alternative provides a reasonably early examination of potential safety problems. The second alternative also necessitates reiteration through the test planning phase of the program in order to guarantee that all potential hazards have been identified and dealt with before initiation of the test effort.

The first approach relegates safety to a relatively unimportant consideration to the basic planning process until the entire program has been planned to a point where it is not easy to make major changes to equipment or program direction in order to achieve a safety test program. Clearly then, the second alternative, although somewhat lacking initially, and requiring more total effort, provides a much more effective solution to the safety problem.

This document, therefore, is the initial safety analysis. It is based on certain assumptions concerning the orientations and configurations of the vehicle. The purpose of this section is to state clearly these assumptions. Fundamental to this program is a continuing examination of the validity of the assumptions stated below.

2-4.1 Orientations/Configurations

The F-14 will be positioned in the facilities in several configurations and orientations during the test. In the HPD facility, it will be positioned on the ground simulating Ground Alert, both with the fuselage perpendicular and parallel to the pulser, with designated weapon configurations. During this phase of testing, a wire mesh will be in position under the aircraft to simulate an aircraft carrier deck. Later in the test, the aircraft will be placed on the ten meter high wooden test stand built for the F-16 test to simulate the in-flight configuration. Figures 2a and 2b show the orientations with the fuselage parallel to the pulser.

In the VPD-II facility, the aircraft will be placed on the ground with the tail of the aircraft perpendicular to the pulser as shown in Figure 2c.

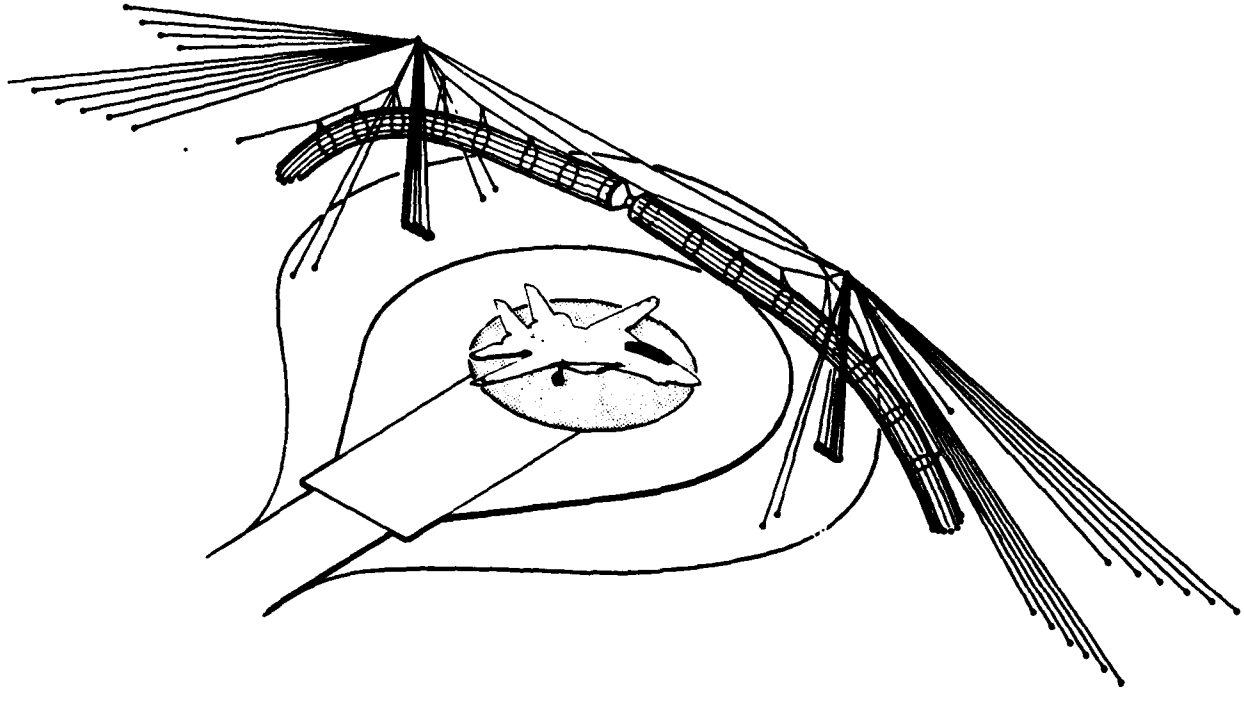


Figure 2a. Ground Alert I E11

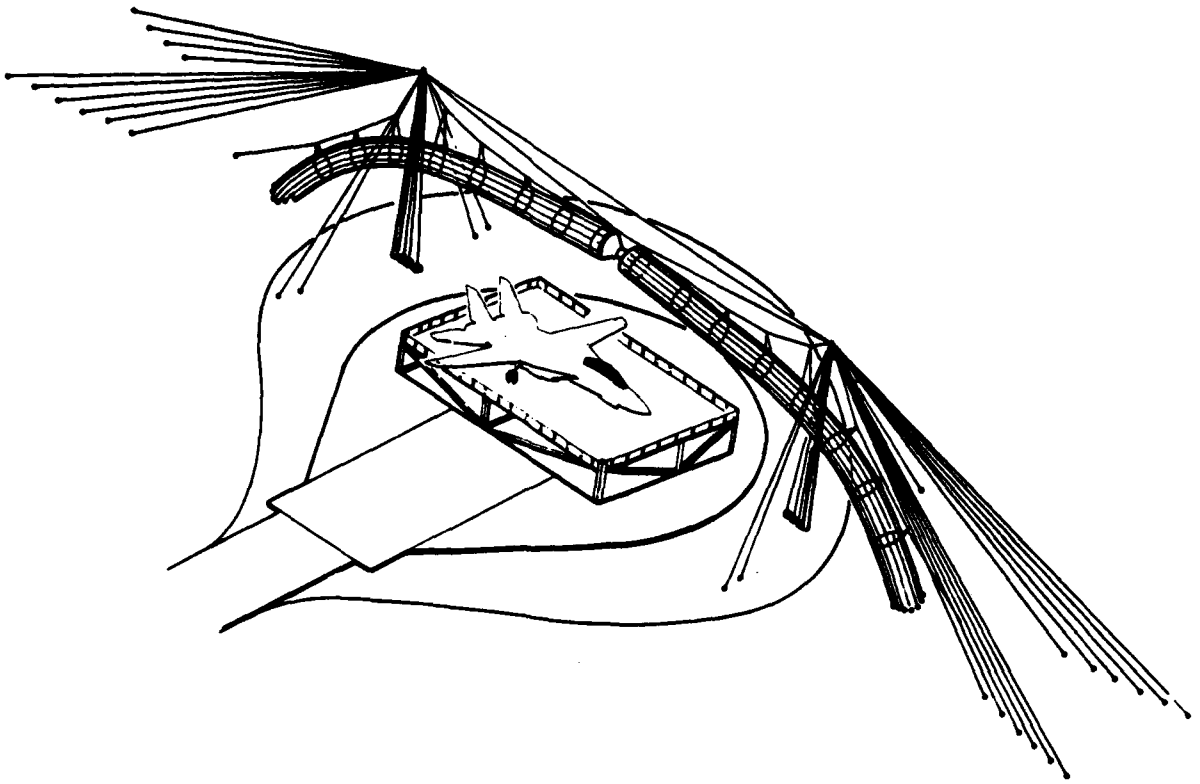


Figure 2b. Test Stand E11

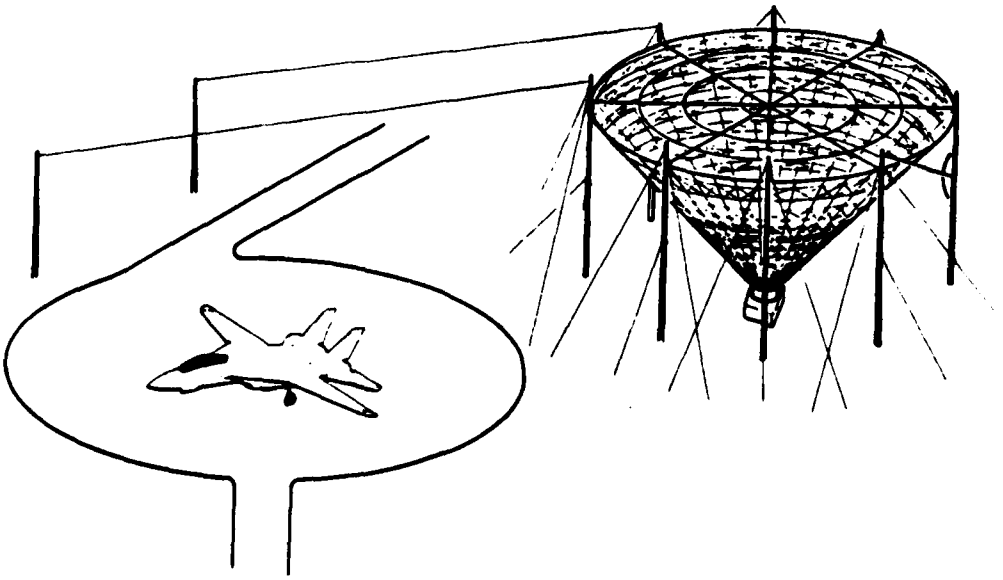


Figure 2c. Ground Alert 11

2-4.2 Access to F-14

Access to the aircraft will be achieved by use of a workstand and existing access ports.

2-4.3 F-14 Power Conditions

For the F-14 program, testing will be performed in both the power-on and power-off modes. For power-on operations, both aircraft engines will be operated at idle. The normal generators will supply electricity for the on-board electronic and electrical systems. All F-14 personnel having access to the test area will be briefed before hands-on personnel access is authorized on planned operations, hazards, communications, and peculiar situations that may arise during power-on testing. Ground support equipment needed in case of emergency will be located as close to aircraft as possible without interference to test operations.

2-4.4 Artery Instrumentation System

The artery concept consists of telemetry data links and remotely operated coaxial switches. The data links are placed and properly bonded in selected aircraft areas having a high density of mission-critical wires. The coax switches are then used to branch off to as many as eight specific test points per switch. Once a data link is in place, removal should not occur for the remainder of the test measurement series. This concept will considerably reduce the down-time during a normal test day, as a full measurement series can be instrumented in the evening or early morning when the entire test team is not present.

2-5 SAFETY PROGRAM OVERVIEW

Figure 3 represents an overview of the F-14 system-level EMP test safety program.

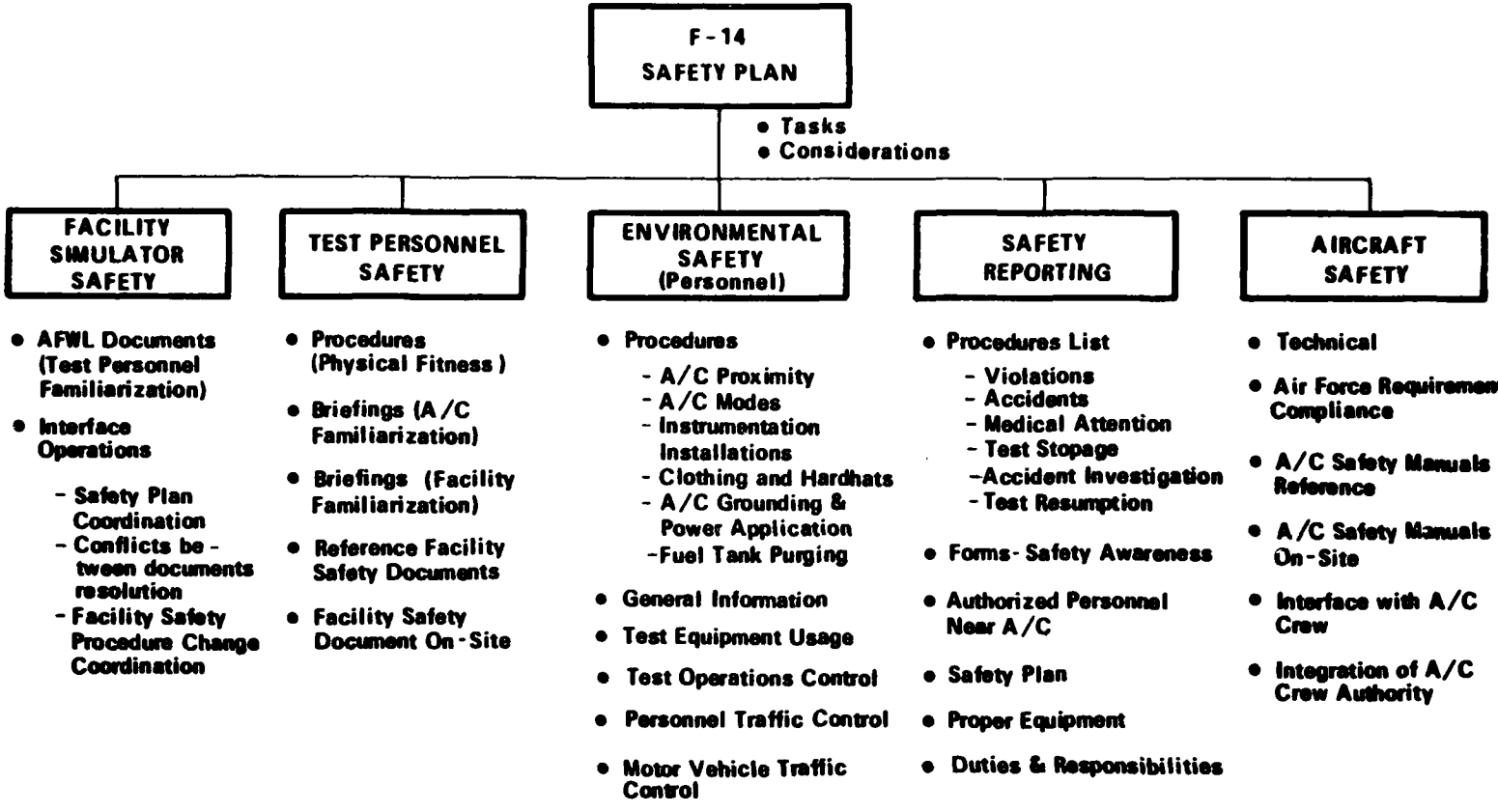


Figure 3. Safety Tasks/Considerations

SECTION 3

FACILITIES DESCRIPTION

3-1 HORIZONTALLY POLARIZED DIPOLE (HPD)

The HPD (Figure 4) facility is the newest horizontally polarized simulator at KAFB. The HAG-IIC pulser will be the radiation source for HPD. The HAG-I-A pulser is the alternate for HAG-II-C.

The HAG-IIC produces fields of approximately 35 kV/m directly beneath the pulser which is suspended 30 meters (98.4 feet) above the parking pad. At 100 meters from the pulser, the field is approximately 8 kV/m.

The HPD antenna is shaped somewhat like a half ellipse with a major diameter of 150.7 meters and a minor radius of 30 meters. Though much larger, the HPD structure takes on the shape of SRF when it is up and in position.

The HPD site also has a portable recording station called DAS (Data Acquisition System). Fiber Optic Link (FOL) receivers, digitizers, timing equipment, and computer control are housed in a shielded compartment within a van. It is usually located 61 to 73 meters away from the test vehicle in a null area of the HPD antenna. For this test program, DAS will be configured for eight data channels simultaneously with two digitizers per channel available.

The facility also has a reference sensor station for monitoring and recording the radiated environment as a performance check on the pulser's operating parameters; i.e., risetime, level, and pulse shape.

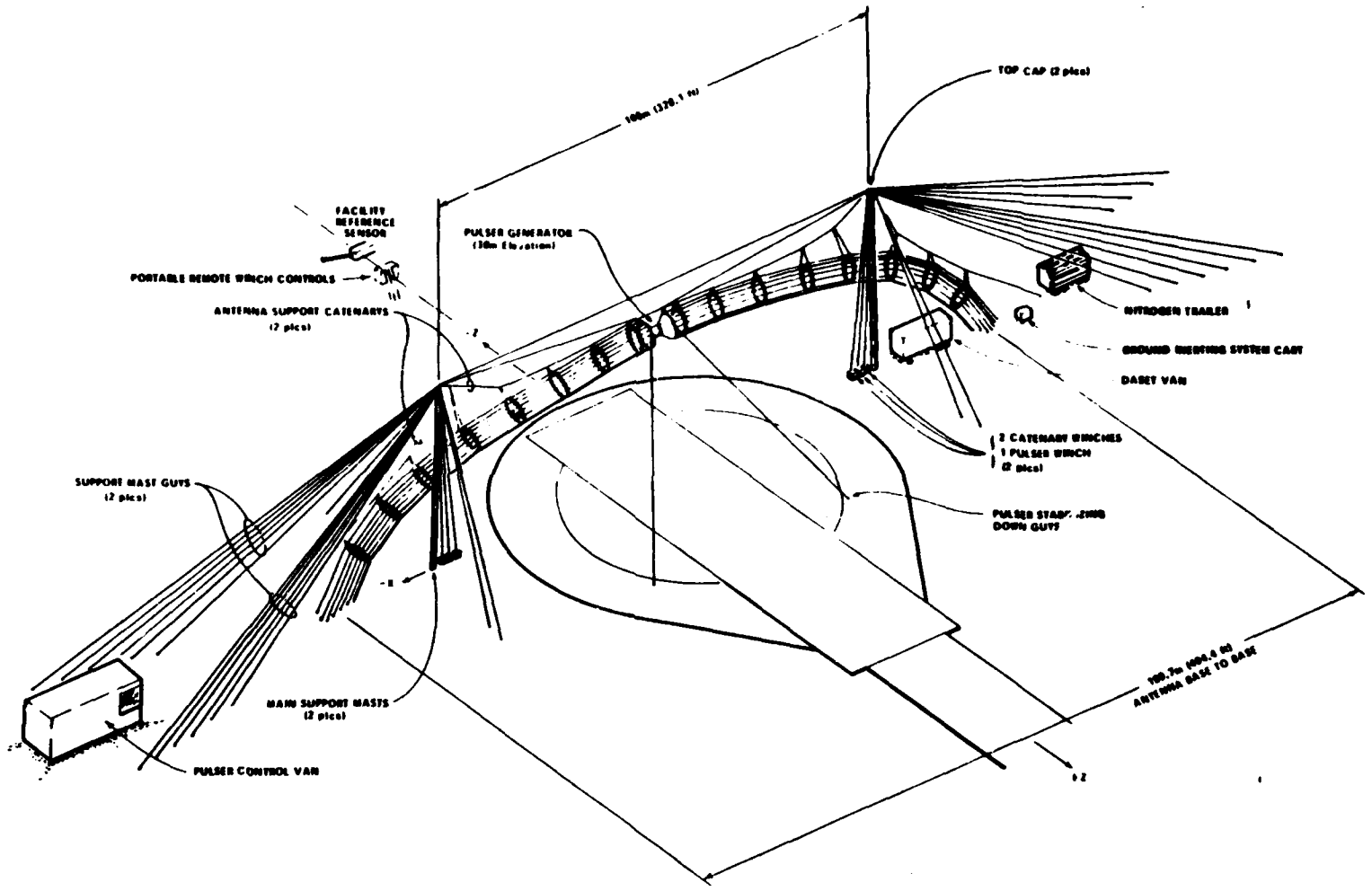


Figure 4. HPD Facility

3-2 VPD-II FACILITY (VPD-II)

The VPD-II facility (Figure 5) consists basically of a five megavolt pulser, gas box, suspended radiating antenna, suspension system, ground plane, command, control and monitoring system, a test pad and other ancillary supporting systems.

The five megavolt pulser is located in an underground pulser room at the antenna/pulser apex. A 9.1 meter diameter gas box containing the pulser monocone extends from ground level directly over the pulser to a height of 5.4 meters. A solid cone transition continues from the gas box/monocone for approximately 0.6 meters to the antenna interface at which point the antenna is attached (6.0 meter height).

An underground reinforced concrete trailer shelter is located near the test pad under the ground plane. The shelter is large enough (11m x 14.6m x 4.2m high) to house the VPD II Command and Control Van and a user instrumentation van. A roll-up door (7.3m x 3.9m high) provides protection from the outside climatic conditions. Access to the shelter is provided by a 5.5 meter wide ramp extending to the ground surface. The trailer shelter provides electrical power, lighting, ventilation, water and fire protection and warning systems for the user. The trailer shelter is connected to the pulser building and test pad centerline via underground electrical conduits for routing cables to command the pulser and to receive test data from the pad. It is also connected to several reference sensors located on the facility centerline midway between the apex and test pad. The trailer shelter provides no heating or air

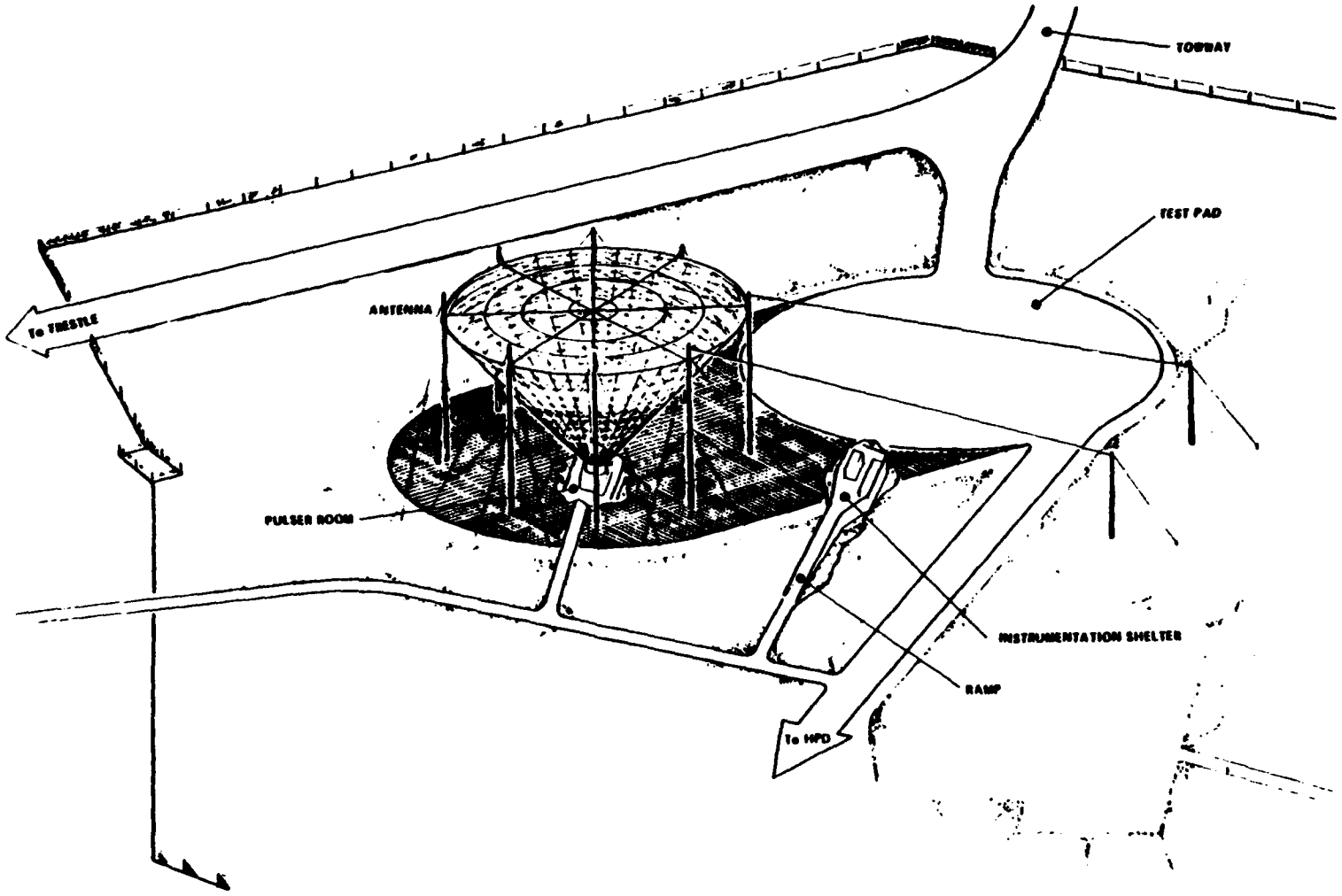


Figure 5. VPD-II (Artist's Concept)

conditioning as these systems are contained within the command and control and test instrumentation vans.

Four EM reference sensors are mounted on the facility ground plane; two each on the facility centerline 50 meters from the apex and two each within the pulser gas box. These sensors monitor the EM environment during test operations. Sensor signals are transmitted to the recording equipment within the Command and Control Van via coaxial cables routed through the welded metallic conduits beneath the ground plane.

The test pad is a 50 meter radius, concrete slab located 100 meters from the simulator apex. The slab is 30 cm thick and is covered by the ground plane and the 7.6 cm thick asphalt overlay. The test instrumentation cable port is located at the test pad center point from which the underground, welded steel conduit is routed to the instrumentation trailer shelter. Tie downs and static ground points are incorporated into the test pad.

SECTION 4

SAFETY REQUIREMENTS

This section of the Safety Analysis Document summarizes the sources of criteria, considerations and requirements relating to safety. There are primarily three controlling documents relating to safety which have been examined in considerable detail in the formulation of this safety program. They are:

1. Air Force Weapons Laboratory Regulation 127-1, Safety (Reference 1).
2. Air Force Regulation 127-101, (Reference 3).
3. OSHA, Occupational Safety and Health Standards (Reference 4).

Each document is discussed briefly below.

4-1 AIR FORCE WEAPONS LABORATORY REGULATION 127-1

This regulation has been prepared by the Air Force Weapons Laboratory to implement a safety review procedure which is required by Air Force Systems Command Regulation 127-4. It is primarily concerned with the establishment of a Safety Program within the Air Force Weapons Laboratory. This document further presents an outline of the manner in which preliminary hazard analyses are to be performed. Hazardous elements are defined, events causing a hazardous condition are examined, events causing potential accidents are reviewed, and the effects are determined. Accident prevention measures designed either to eliminate the hazard or to minimize the potential danger are then determined.

The safety analysis which is contained in Section 5 of this document is essentially in five parts. The first part addresses the analysis of hazards associated with the aircraft arrival and departure. The second part discusses potential hazards during ground transportation of the aircraft at HPD, including entrance into the facility. Aircraft maintenance operations are included in the third part. F-14 EMP test preparations are next. The fifth part addresses the hazards to be encountered in the HPD when test operations are in progress.

4-2 AIR FORCE REGULATION 127-101

The purpose of this manual is to provide guidance for Air Force wide industrial safety accident prevention programs. It explains the hazards in and prescribes safety precautions for operating industrial types of equipment. It is designed to augment other Air Force publications. It covers such subjects as the fundamentals of accident prevention, safety practices in construction and maintenance, health hazards and protection, fire protection, and safety in materials handling. This is a detailed general safety document which addresses the majority of safety considerations encountered in day-to-day contractor operations. Potentially hazardous operations encountered in the F-14 test which are covered by this document will not be analyzed any further in great detail. The recommended safety procedures, equipment, etc., designed in AFR 127-101 will be adopted for this program.

4-3 OSHA

This document (Reference 4) is a very broad and detailed delineation of safety standards for industry in

general. It covers a very wide variety of occupations and working conditions. Sections of this document which relate to construction and testing of work platforms are those most relevant to the safety analysis for the F-14 testing.

4-4 COMPARISON, OSHA, AFR 127-101, AND AFR 127-12 STANDARDS, (REPLACING AFR 127-101)

A review of OSHA, Chapter XVII, Occupational Safety and Health Administration, Department of Labor, Section 1910, contained in the Federal Register dated 18 October 1973, has been conducted in order that a comparison can be made with the Industrial Safety Accident Prevention Handbook, AFR 127-101, dated 26 June 1970, Department of the Air Force. The purpose of this review was to ascertain any conflicts between the two documents. No conflicts were found. In some cases, OSHA is much more detailed, but the same rules and regulations can be found in AFR 127-101. The Air Force is phasing in a replacement for AFR 127-101 designated AFR 127-12 (Reference 5). For completeness this document is included in the comparison. The major areas of concern in support of this test program are shown in Table 1, with the corresponding OSHA and AFR paragraph and page numbers cross referenced.

4-5 ADDITIONAL REQUIREMENTS

Although the previously discussed documents go into great depth and cover a very wide spectrum of safety conditions, procedures and equipment, the basic rule of safety, "common sense," has not been ignored in the preparation of this document. The safest procedures result from education of test personnel of the hazards that could be encountered and

TABLE 1

CORRESPONDING OSHA AND AFR PARAGRAPHS

Document					Title
OSHA*		AFR 127-101**		AFOSH** Standards	
Paragraph	Page	Para.	Page	Number	
1910.22	22108	4-3	4-7	127-1	Walking-Working Surfaces
-	-	4-14	4-34	*** Section E & Atch. 2	Contractor Operations
1910.25	22110	4-10	4-25	127-4	Ladders, Wood
1910.26	22117	4-10	4-26	127-5	Ladders, Metal
1910.28	22121	4-10	4-16	127-7	Scaffolding
1910.67 1926.556+	22136	-	-	127-9 Manually Propelled	Vehicle Mounted Elevating and Rotating Work Platform
1910.97	22162	10-27	10-11	161-9	Electromagnetic Radiation
1910.106	22169	7-2	7-3	-	Flammable and Combustible Liquids
1910.109	22193	-	-	-	Explosives, AFR 127-100
1910.132	22231	5-13	5-17	-	Personnel Protective Equipment
1910.144	22238	4-11	4-27	-	Safety Color Code for Marking Physical Hazards
1910.145	22239	4-111	4-31	-	Accident Prevention Signs
1910.151	22242	-	-	-	Medical Services and First Aid
1910.156	22242	Chapt. 6	6-1	-	Fire Protection
1910.169	22253	4-9	4-24	-	Air Compressors
1910.176 through 1910.180	22253	Chapt. 11	11-1	-	Materials Handling
1910.241 through 1910.244	22294	Chapt. 3	3-50	-	Hand and Portable Power Tools
-	-	2-16 Sec. D	2.4	*** Section C	Education and Training

*Title 29 - Labor Chapter XVII - Occupational Safety and Health Administration, Department of Labor, Part 1910 - Occupational Safety and Health Standards, Federal Register, Volume 37, No. 202, October 18, 1972.

**Industrial Safety Accident Prevention Handbook, Department of the Air Force, 26 June 1970.

***AFR 127-12, Air Force Occupational Safety and Health Program, 4 June 1976.

+Safety and Health Regulations for Construction.

consistent exercise of good common sense. Thus, as the analysis of the site operations for testing proceeds safety hazards, or potential safety hazards will be identified and dealt with, even those which do not fall directly within the scope of one of the above mentioned reference documents. The intent of this document is not to provide an analysis which relates strictly to the written requirements documented in Paragraph 4-1 through 4-4 above, but is to examine all aspects relating to a safe operating environment with the F-14 in the HPD facility, and to address all potential problems which are uncovered. The goal is not a document which only demonstrates a compliance to requirements, but also a safety test program.

4-6 HPD FACILITY SAFETY ANALYSIS AND HAZARDS (Reference 2)

The Dynalectron Corporation (and EG&G as a subcontractor) as the O&M Contractor of the simulators for the AFWL, has prepared a hazards analysis document. F-14 test personnel will be familiar with the contents of this document.

4-7 VPD-II FACILITY SAFETY ANALYSIS AND HAZARDS (Reference 6)

EG&G WASC has prepared a Facility Safety and Hazards Analysis document. All F-14 test personnel will be familiar with the contents of this document.

SECTION 5

HAZARD ANALYSIS

This section of the Safety Document for the F-14 tests in the HPD and VPD II facilities presents the Hazard Analysis for the test operations. The Hazard Analysis has been performed in accordance with Attachment 3 of AFWLR-127-1 (Reference 1). This section presents the test operations sequence, the hazard analysis that has been performed, and summarizes the main safety procedures to be applied which are derived from this analysis.

5-1 EMP TEST OPERATIONS

The test aircraft will be maintained in a near operational configuration by NWEF personnel during pre-test and Grumman personnel during HPD/VPD-II testing. To demonstrate that the aircraft equipment remains operational throughout the course of the EMP testing, periodic end-to-end functional checks will be performed by Grumman a/c support personnel.

In order to organize the Hazards Analysis, the test operations have been examined and the major functions of the program operating sequence have been identified. These functions are:

- F-14 Arrival and Test Modification
- F-14 Test Preparation and Daily Maintenance
- F-14 EMP Testing
- Test Stand Mount and Mobility
- Demodification and Departure

5-1.1 F-14 Arrival and Test Modification

Upon arrival, the aircraft will be hangared and prepared for modification to the approved basic airframe and systems test configuration as outlined in the General Test Plan. This will include fuel tank defuel, purge and inerting system preparation; replacement of an "active" crew seat with an "inactive" seat and removal of some selected crew escape system pyrotechnics; installation of instrumentation peculiar harnesses, panels and bracketry; aircraft engine preservation; checkout of weapon pylons and racks on two wing stations; conduct minor wiring and hydraulic changes to round out the test configuration.

5-1.2 F-14 Test Preparation and Daily Maintenance

Daily airframe and system maintenance, including that of on-board instrumentation reconfigurations to point of DASET interface will be accomplished by a supervised Grumman/EG&G work force. A typical work day is depicted in Figure 6. As in any test program, deviations to this will come about and have to be accommodated.

The test configured airframe and systems will require continuous preventive maintenance, repair/replacements and test configuation changes during the two shift work day. The intent is to assure that all F-14 systems continue to operate satisfactorily to provide for a viable EMP test.

After the aircraft has been erected and secured to the test stand (for that phase of testing) and the hoist sling and ballast removed and top-side panels closed, the aircraft is ready for test preparations/release. Externally provisioned

TIME	ACTIVITY	ORGANIZATION RESPONSIBILITIES		
		O&M (DYNE/TRW)	USER (DNA/TRW/EG&G/NWEF)	GRUMMAN
6:30	Morning Prep Prep	• HPD-Raise/Turn-On -Warmup/Checkout • DASET/ADSET Ready • Q.C. Instrumentation	• Review Data • Q.C. Instrumentation • F/O-Setup-C/o • A/C Position	
7:00	BRIEFING	ATTEND	BRIEF	ATTEND
8:30	Testing	• Operate-DASET/ADSET -PULSER	• Direct Test • Perform and Q.C.	
5:00	End Test Day	• HPD Lower and Secure • DASET/ADSET Shotdown • Equipment Maintenance as needed	• Review Data • Plan for Next Day • Perform and Q.C. • Instrumentation changes	A/C Maintenance as required

Figure 6. F-14A Daily Test Operation

ground power, cooling air and fuel tank inerting facilities will be connected and checked out to ensure airframe/systems compatibility and adequacy. Tech Orders, AEIs, engineering drawings and specifically prepared procedures will be used for these and the daily servicing operations to follow for the next several months.

Airframe and systems cooling air will be provided from one or possibly two remote air conditioning carts via non-conductive duct work.

Continuous fuel tank inerting with low pressure gaseous nitrogen will be provided from a remote source via non-conductive line.

Potential hazards associated with these servicing actions will be minimized by following established F-14 servicing procedures as well as those developed specifically for the peculiar test configuration and operations. All servicing will be performed by certified qualified personnel. These peculiar procedures will comprise part of the Class II, Part II modification documentation.

Daily airframe, systems and instrumentation test preparations and operations while on the test stand will require access to practically all areas of the aircraft. Personnel access to the avionic bays, engine compartment and many other pre-postflight maintenance/inspection areas are at ground (deck) working level, negating the need for a number of workstands. Access to the cockpit will be via specially constructed wooden stands which will remain on the test stand deck. Access to top-side of the aircraft should be minimal and can also be

effected with one of the wooden stands. Access panels are either structural, installed with retained quick-removal fasteners, or non-structural, which are hinged and thumb latched for ready access.

Some aircraft configuration changes may be required during the tests, such as sealing selected points of entry (POEs), sealing off deliberate antennas and raising and lowering the canopy.

The inputs for test preparation configurations will be given by the Test Director to the designated test support personnel at controlled pre-test briefings. These requirements will be documented via airframe/system QARs and instrumentation FCRs. This paper will constitute authority for configuration changes, maintenance, repair and replacements and become part of the official aircraft record. All aircraft/system activities will be directed by qualified design/test engineering and maintenance supervision. Instrumentation activities will be directed by qualified instrumentation engineers. the aircraft Release-For-Test will consist of a consolidation of these activities. It will be aproved by maintenance/instrumentation supervision and finally certified by Flight (Test) Release Quality Control personnel.

Following the daily EMP test activity, the stand/ aircraft may be moved out from under the HPD array and prepared for aircraft/systems preventive maintenance, diagnostic troubleshooting, removals/replacements, instrumentation reconfigurations and pre-release for the next day's operations.

The aircraft will be properly grounded using approved static grounding procedures at all times other than when required during actual EMP testing. Communications will always be maintained between the aircraft on the test stand deck and the ground support personnel. Hard hats and other applicable safety equipment will be worn, as required in the area of the test stand. Loose equipment will be secured. Adequate portable lighting will be used. Only approved tools, test equipments and maintenance procedures will be used. Peculiar test base instructions (TBIs) will be developed on-site to comply with local operations requirements.

5-1.3 F-14 EMP Testing

A test day will begin with a Test Director's morning briefing, consisting of an aircraft/systems/instrumentation status review, followed by an engineering test plan briefing with the HPD contractor and subcontractor test plan personnel.

Assuming the HPD array and aircraft are ready - a formal pre-test release will proceed assuring proper instrumentation sensor installations, all points of entry are identified and sealed, as required, and panels installed. The test stand will be prepared and moved under the HPD array after clearance has been given to do so. The aircraft/systems supportive power, air conditioning and fuel tank inerting will be connected and powered-up, as will the instrumentation fiber optic trunkline to DASET interface. The test stand/aircraft, HPD pad area will be cleared of all extraneous personnel and equipments in preparation for Electromagnetic Pulsing.

Following each HPD pulsing, the Test Operations Director will communicate instructions regarding test support activity desired for the following post/pretest. Access to the aircraft cockpit and equipment bays will be frequent to survey the cockpit panels, scopes, gauges, as well as conduct routine servicing. This activity will be accomplished by qualified technicians/mechanics.

Hazards associated with the test, post-pretest activities are most likely to occur within the HPD EMP environment and around the elevated aircraft. The electromagnetic environment generated by test facility can vary, dependent upon aircraft location, from a few hundred volts per meter up to levels of approximately fifty thousand volts per meter peak electric field intensity. There are two main events involved in the exposure of the aircraft to the environment.

a. Charging the pulser.

b. Radiation into the facility, i.e., aircraft exposure.

The main hazard associated with this operation is related to the possibility of having personnel in the immediate proximity of some large metallic object, such as the aircraft. The resultant potential hazard is arcing from the metal through the individual to the ground. In previous extensive test efforts in both HPD and VPD EMP simulators, procedures have been established which insure that all personnel are clear of the environment volume during the exposure of the aircraft. The basic approach involved clearing the area prior to the time the pulser is charged, monitoring the area throughout the charging

period and the exposure time to assure that no personnel enter the exposure volume during the testing. A highly conspicuous flashing light and loudspeaker announcement are used to alert personnel when dangerous conditions exist in the test pad. This procedure continues to apply at the HPD.

Another event causing a hazardous condition is the raising and lowering of the HPD pulser/antenna system. This operation will be coordinated between the Test Operations Director and the Facility/Pulser C&C operator to prevent any unsafe conditions from occurring. A briefing to the test personnel regarding the test hazards and strict compliance with procedures specified will minimize the likelihood of an accident.

5-1.4 F-14 Test Stand Mount and Mobility

Following aircraft modification, the F-14 will be towed by NWEF personnel from the KAFB hanger to the Horizontally Polarized Dipole (HPD) site for ground alert testing. Weapon shapes will be uploaded to the designated wing stations and the aircraft/weapon electrical interface checked out. An offsetting pylon/ballast will be attached to the opposing wing stations. Peripheral test site support preparations will be in progress at this time assuring operation of ground support equipment, fiber optics data transmission, HPD power-up conditions and establishing logistics and personnel operations facilities.

Following ground alert mode testing, the aircraft will be tested on a specifically designed and structurally sound mobile test stand (7.9mH x 12.2mW x 21.6mL).

A proofload certified aircraft hoist sling will be attached to the aircraft by Grumman personnel in preparation for hoisting the aircraft approximately (10.7 meters) above ground line. Structurally sound wooden support pylons will have been affixed to the nose jack point and wing station weapon hardpoints. With the landing gear extended, weight and balance and structural criteria will have been developed to ensure correct lifting attitude and structural integrity. A structurally sound and adequate crane/boom and proofload certified hook/cable/winch operated by subcontractor qualified operator/riggers under direction of the aircraft contractor will hoist the 63,000 lb. aircraft/weapon/ballast combination. Mobility and structural integrity of the 80,000 lb. test stand have been previously demonstrated. The stand will be moved under the raised aircraft and the aircraft will be lowered to its proper position over the stand and the aircraft/pylons will be secured to the aircraft and subsequently to the test stand deck. Of primary consideration will be the safe mobility of the test stand with the F-14 mounted to its deck (7.9 meters) above the ground.

Potential hazards are those associated with the daily programmed and any emergency movements of the F-14/stand into and out of test position under the HPD array. The stand will be configured with fixed and castered bogies (wheels) at rear corners and a "fifth wheel" attach arrangement for towing with the tractor portion of the tractor trailer by a qualified operator.

To minimize the potential hazards, a select number of contractor(s) personnel will be schooled specifically for the F-14 hoisting, tie-down and test stand relocation operations. The maximum tow speed of the test stand/aircraft will be no more than 1.0 mph (0.62 kilometer/hr.). Sudden accelerations or stops will not be permitted to minimize inertial upset of the F-14. Timely forecasts of wind velocities above that of safe HPD operation will dictate F-14 test stand emergency movement from under the HPD. The bogies will be locked and chocked when at rest. All hydraulic, air conditioning and electrical disconnections will be accomplished before test stand/aircraft movement.

5-1.5 F-14 Demodification and Departure

Demodification at KAFB will involve removal, disconnect of all non-flightworthy equipment and access panels. The pyrotechnics and active crew seats will be reinstalled and checked out. The engine will be depreserved, and JP-4 will be cycled through the fuel tanks. All scheduled maintenance requirements not specifically waived by the Cognizant Field Activity will be accomplished and inspection documented prior to release for flight.

5-1.6 Summary

In examining the set of test related operations, and the safety aspects of each, one can observe a repetitive pattern.

Basically, there are four safety elements to be considered in the test program:

1. The weight and bulk of large objects which must be moved, such as the aircraft and test stand/ aircraft.
2. The operations on the aircraft which involve electrical power connections and personnel working at heights above ground level.
3. The safety aspects related to the EMP environment itself.
4. The maintenance of aircraft flight worthiness, including the prevention of damage to the F-14 systems.

The recommended safety program which is described in the next section and locally prepared procedures will be structured about these main areas.

Figures 7 through 21 contain sketches which depict aircraft configurations and maintenance/test operations.

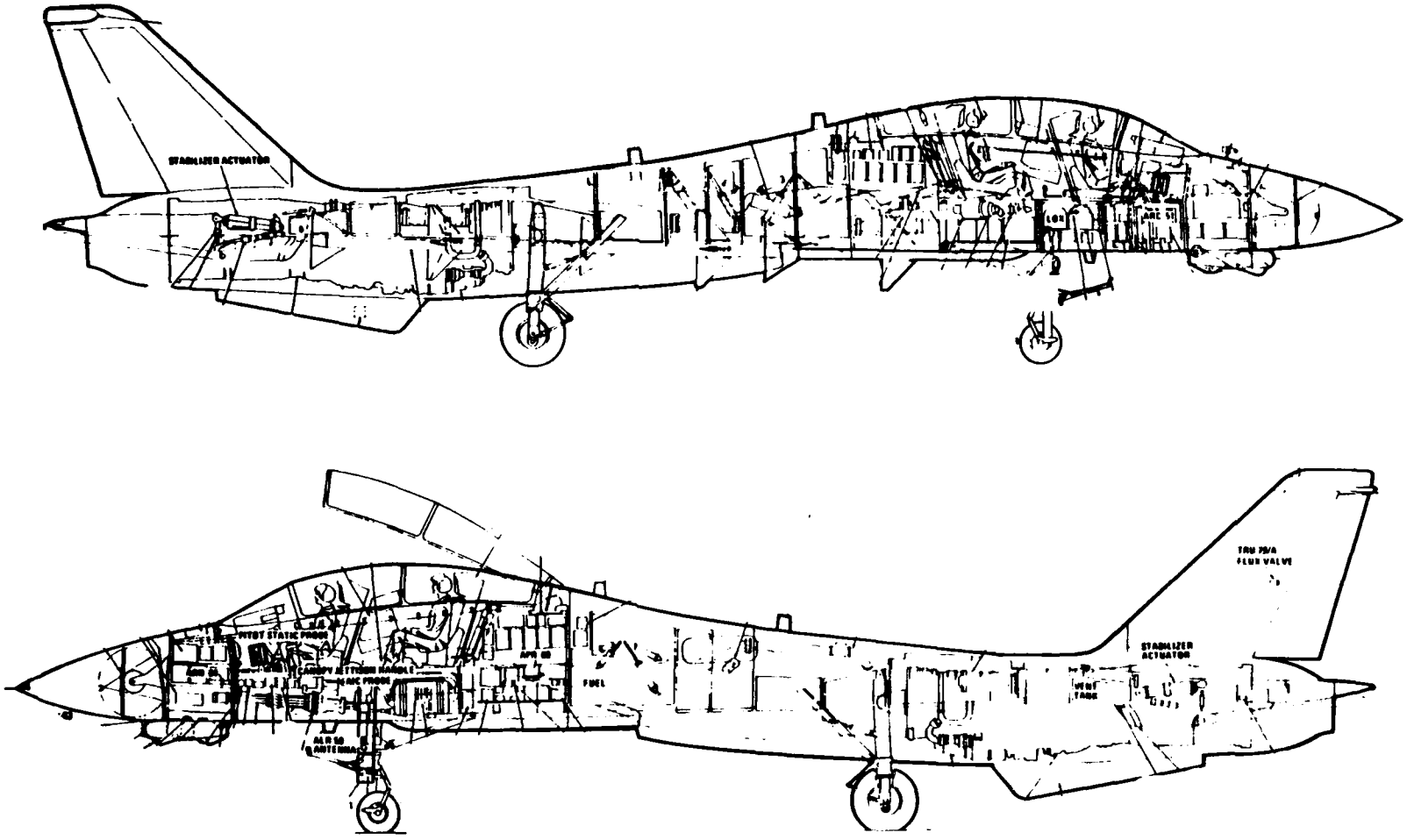


Figure 7. General Aircraft Arrangement

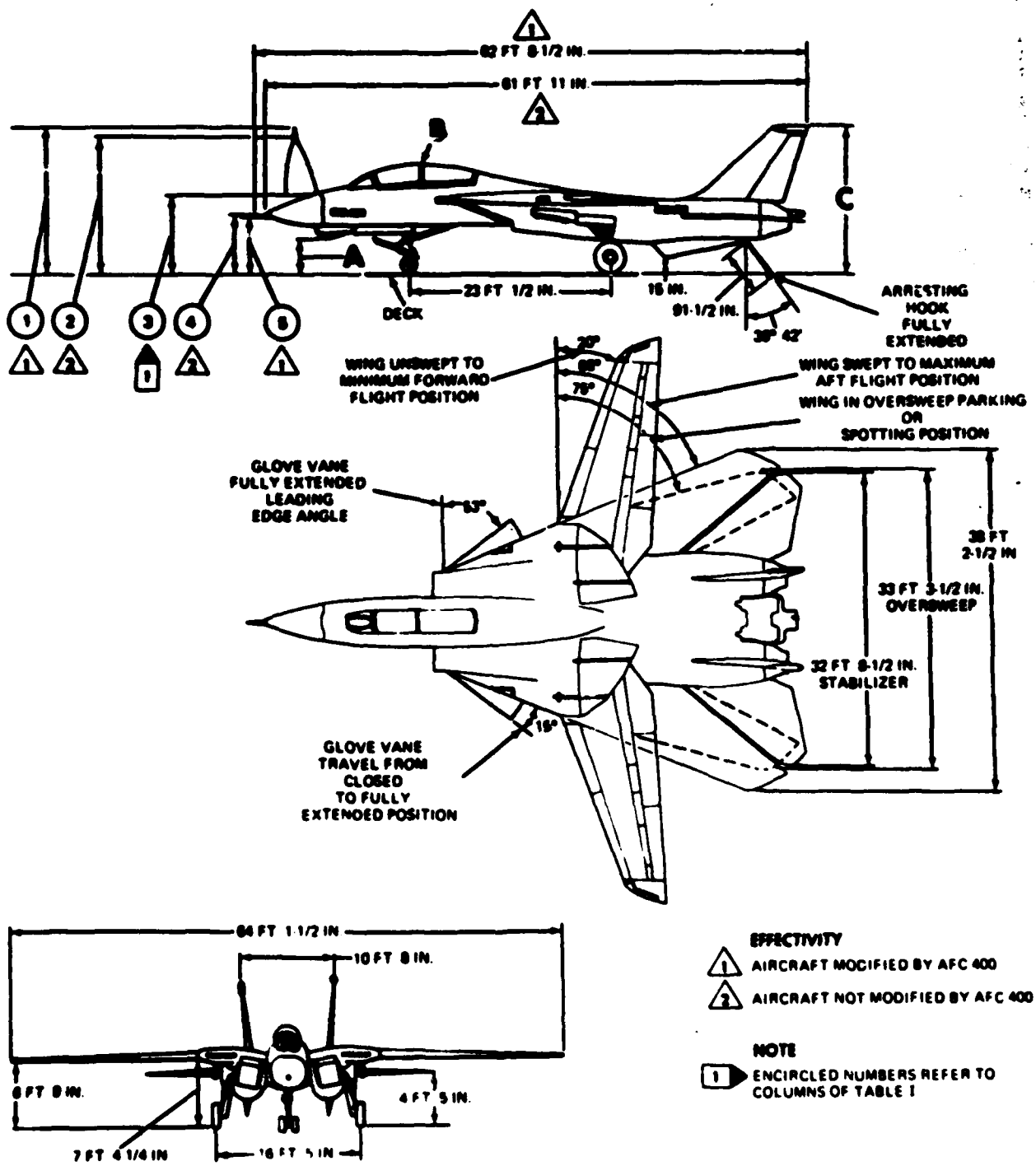


Figure 8. Aircraft Dimensions

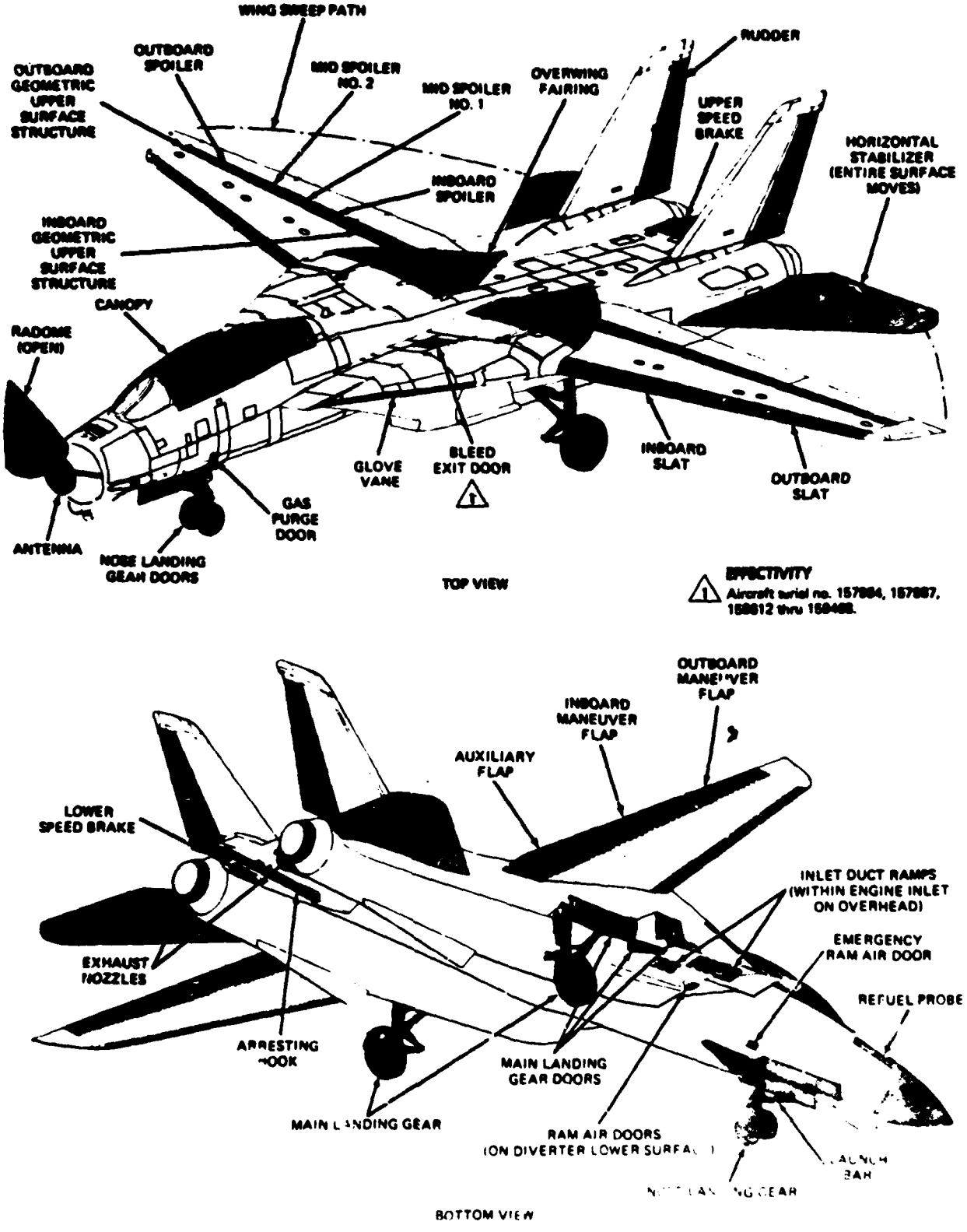
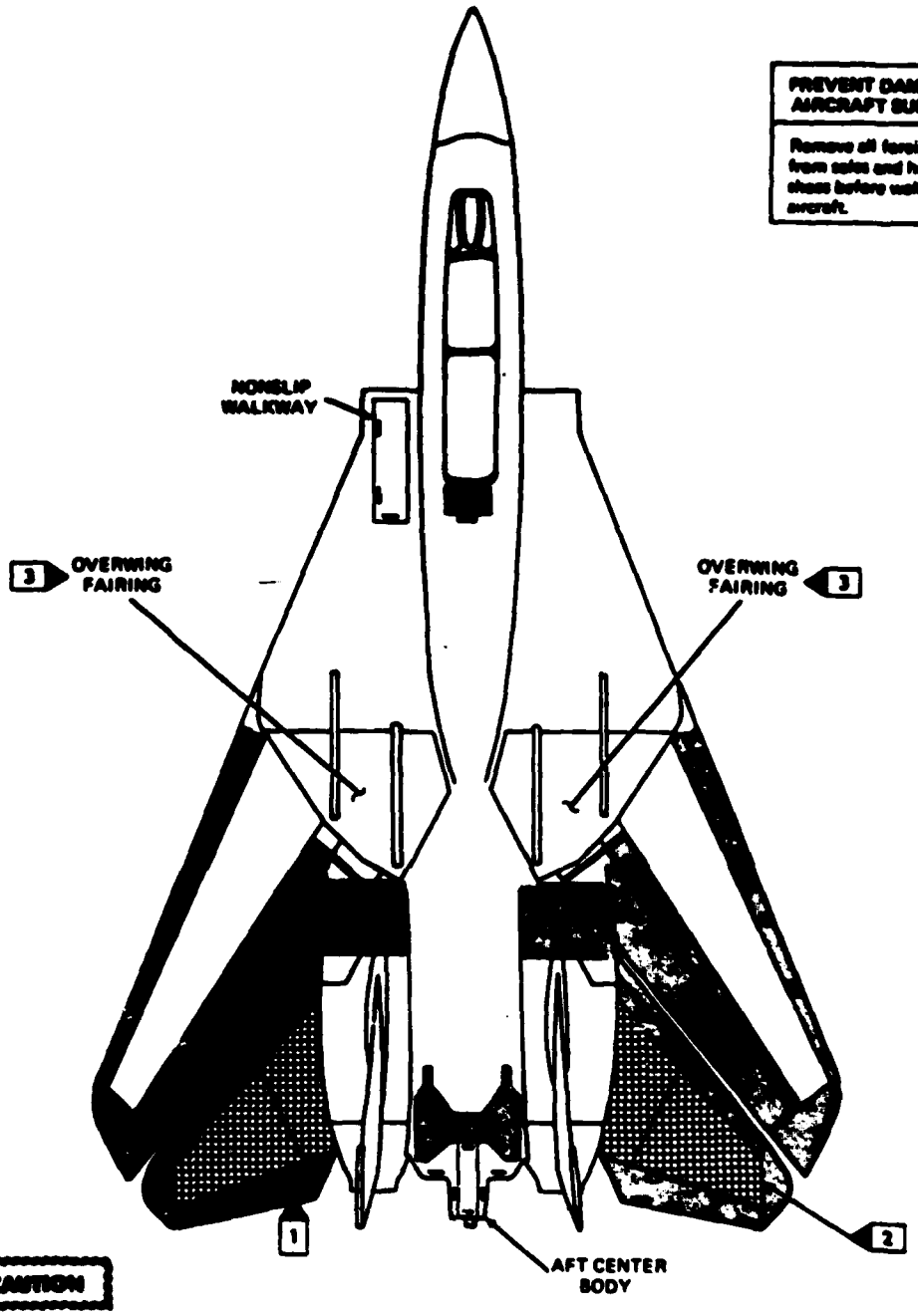
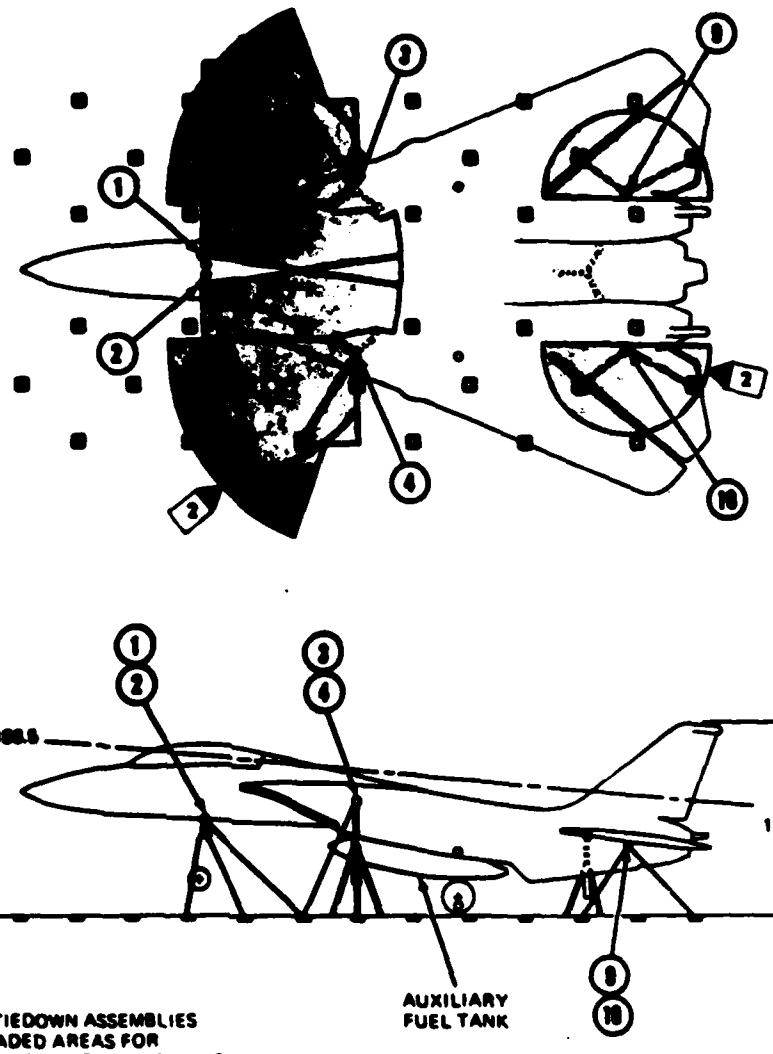


Figure 9. Moving Surface Hazard Areas



AIRCRAFT WALKWAYS

Figure 10. Aircraft Walkways



NOTE

1 USE TWO TD-1A TIEDOWN ASSEMBLIES IN SERIES, IN SHADED AREAS FOR EXTRA LENGTH REQUIRED FOR JACKING AIRCRAFT.

AIRCRAFT TIEDOWN FITTINGS

LOCATION	FITTING NO.	ACCESS NO.
FUSELAGE	1	2221 4
	2	1221 6
WING GLOVE	3	2233 5
	4	1233 5
SPONSON (BELOW HORIZONTAL STABILIZER)	9	6232 3
	10	6232 3

Figure 11. Tiedown Arrangement

Support Equipment Required

Type or Part No.	Nomenclature	Type or Part No.	Nomenclature
A51S61460-1	Aircraft Hoisting/Crash Handling Sling	--	Barge-mounted Crane
		--	Dockside Crane
MB-1A	Heavy-Duty Mobile Multi/ Purpose Aircraft Crash Crane (63,000- to 80,000-pound capacity)	--	Guy Line (as required)
		--	Ships Aircraft Crane (50,000-pound capacity)
NS-50	Mobile Airplane Crash Crane (50,000-pound capacity)	--	Static Ground Wire (as required)
NS-60	Mobile Airplane Crash Crane (60,000-pound capacity)	--	Vehicle-Mounted High-Lift Hoist
SP4092-1	TD-1A Tiedown Assembly (as required)	--	Wheel Chocks (2)

Materials Required

Nomenclature	Quantity	Specification or Part Number
Grease	As required	MIL-G-21164

1. PREPARING FOR HOISTING.

2. SLING PREPARATION FOR AIRCRAFT WITHOUT ENGINES. (See Figure 1.)

CAUTION

Ensure that cable assemblies of hoisting sling are not frayed, broken, corroded, kinked, or twisted about each other, and that all hardware is installed securely.

a. Remove four nuts, washers, and bolts that secure two adjusting cable assemblies to forward cable assemblies and forward spreader.

b. Install one bolt, washer, and nut in terminal of adjusting cable assemblies, then stow adjusting cable assemblies in safe area until required for reassembly on forward cable assemblies and forward spreader.

c. Apply light coat of grease to bolts and inner surface of terminal on forward cable assemblies.

CAUTION

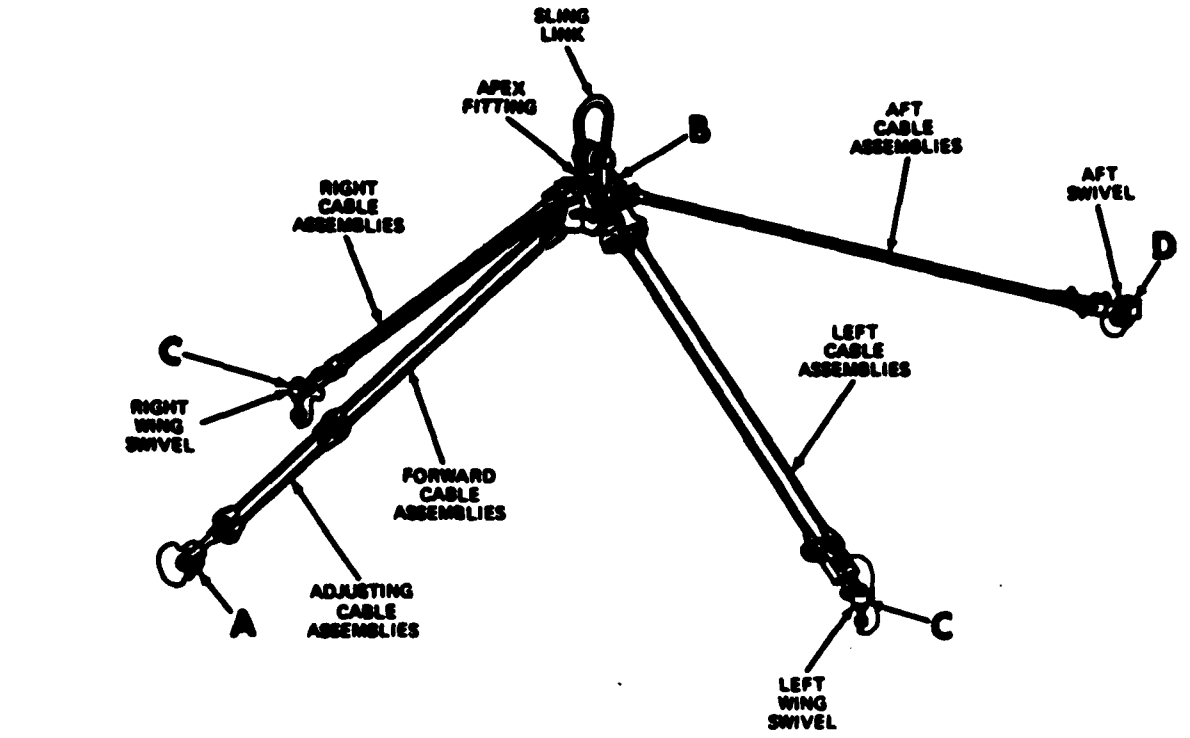
Bolts shall be installed with heads on right side of forward spreader and terminal of forward cable assemblies, to prevent damage to uhf/TACAN upper antenna.

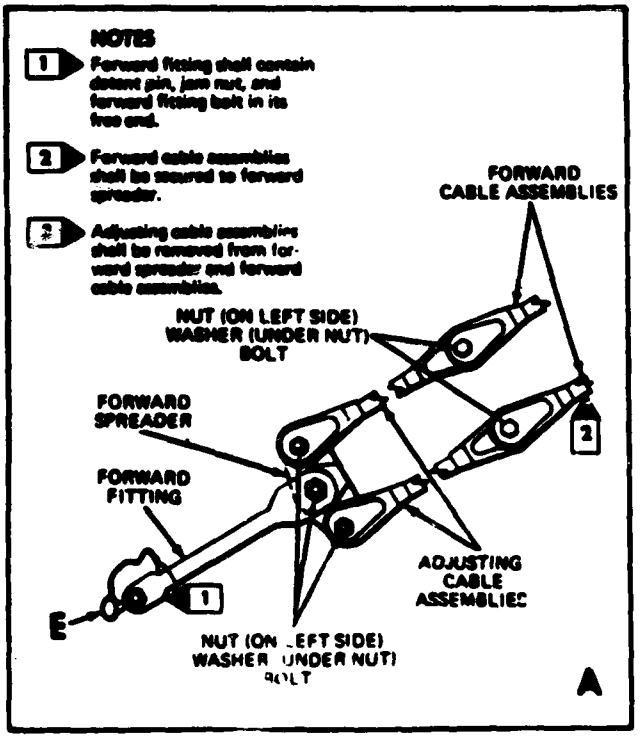
d. Ensure that forward cable assemblies are not twisted, then secure terminal of forward cable assemblies to forward spreader with bolt, washer, and nut removed in step a. (See detail A.)

e. Ensure that forward fitting attached to forward spreader has detent pin, jamnut, and forward fitting bolt in free end. (See detail D.)

f. Apply light coat of grease in inner surface of forward fitting free end.

Figure 12. Support Equipment





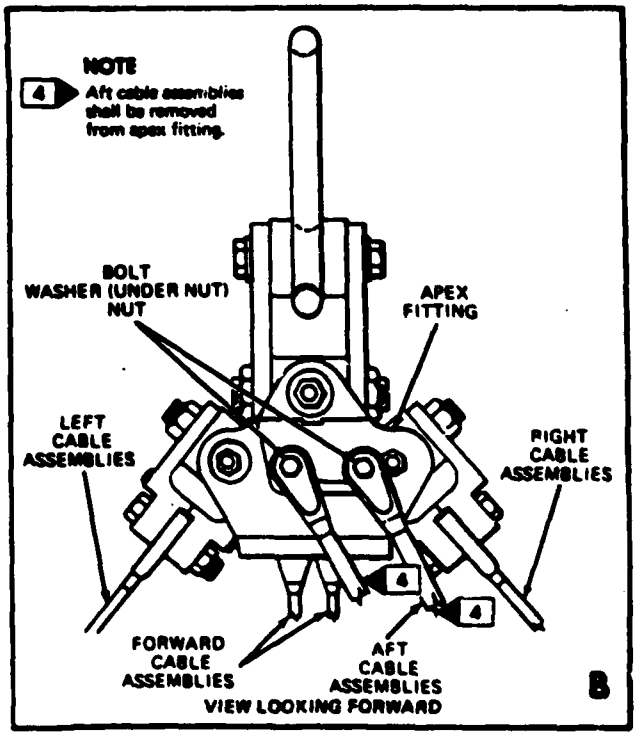


Figure 13. Hoisting

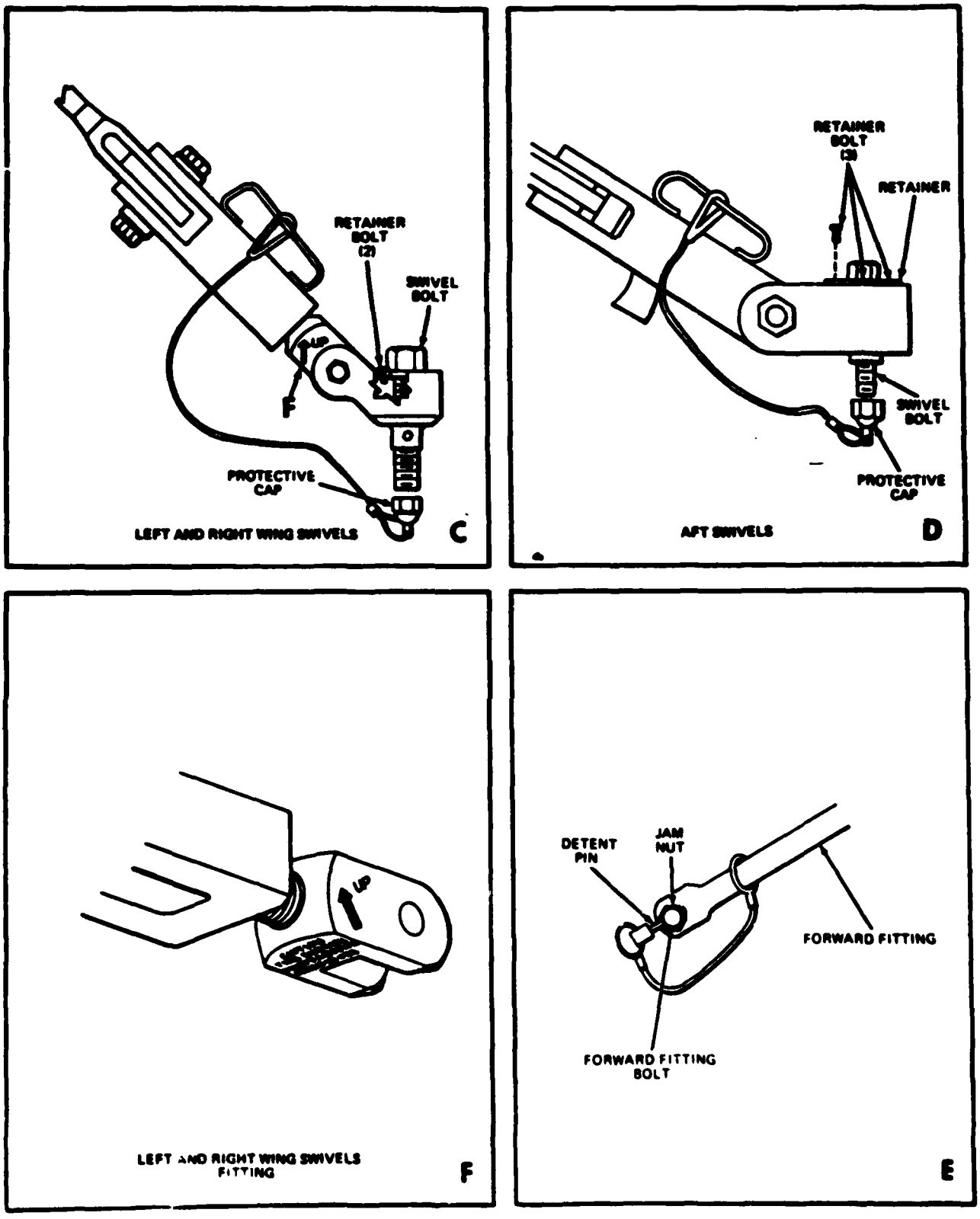
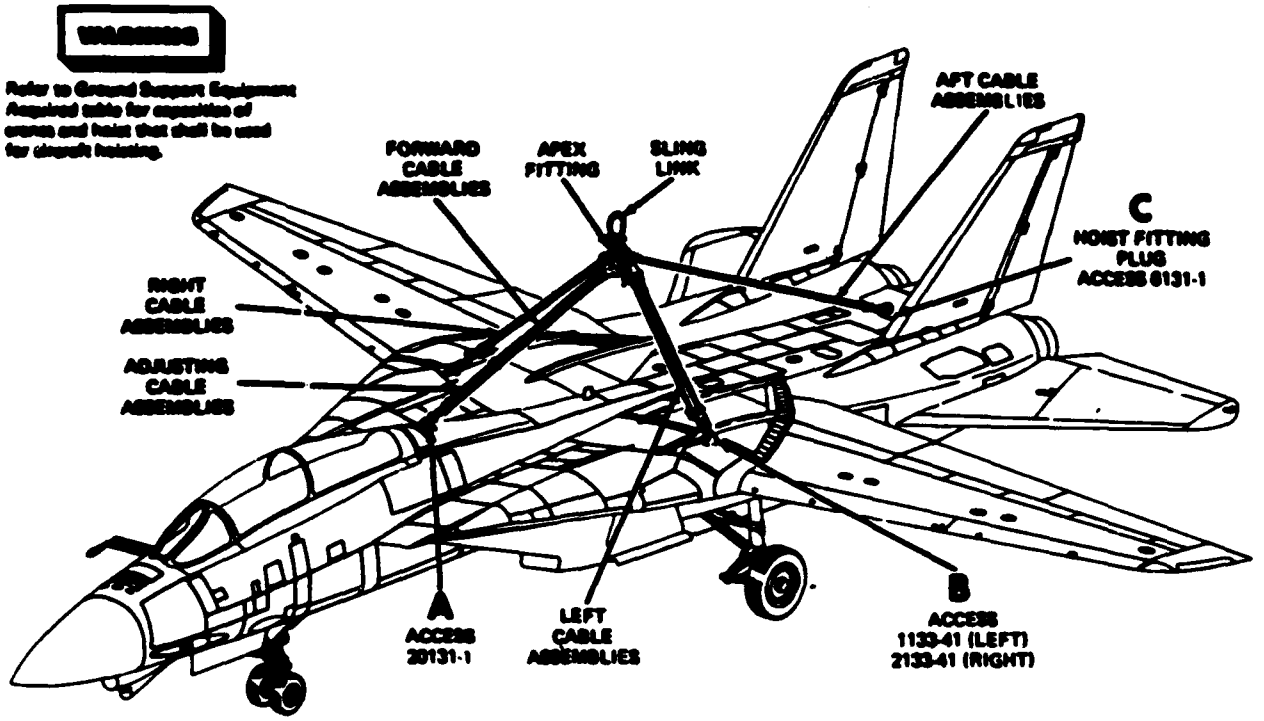


Figure 14. Hoisting



HOISTING ARRANGEMENT WITH ENGINE(S) INSTALLED

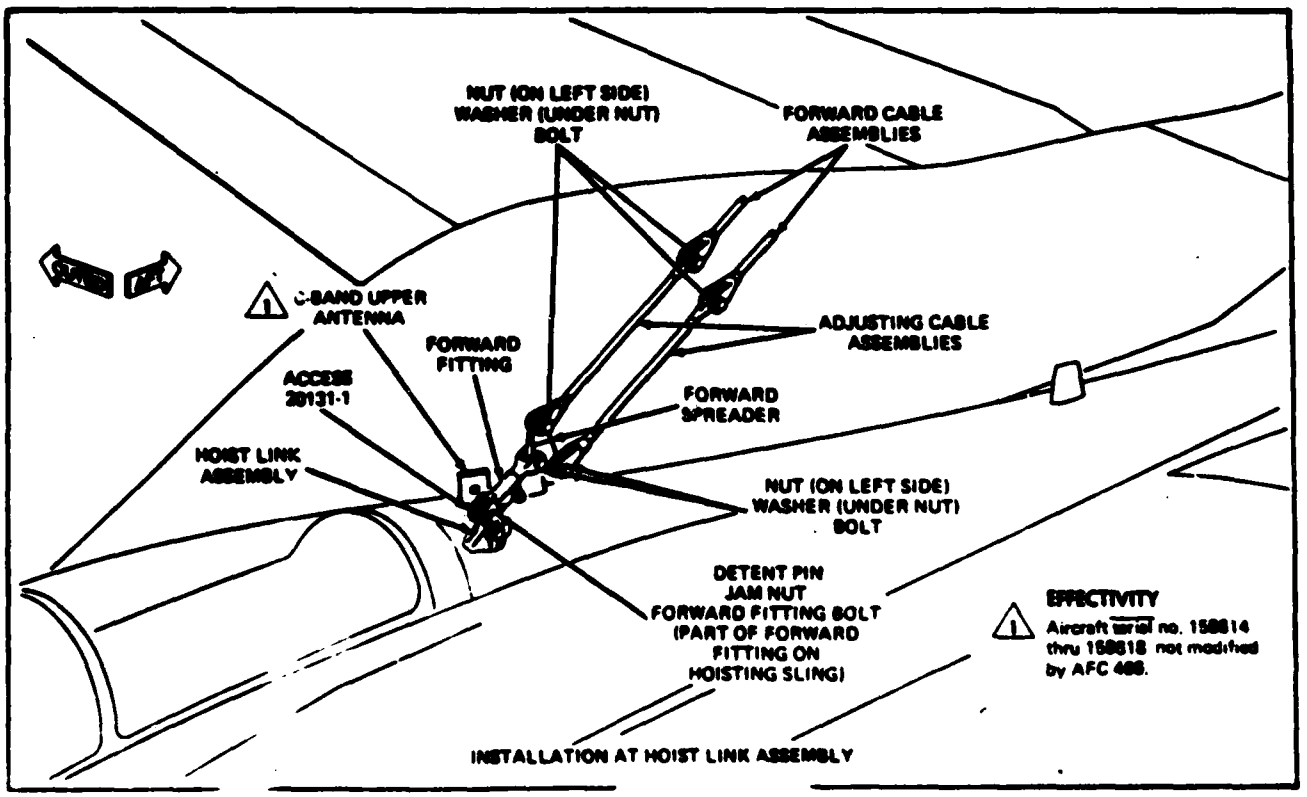


Figure 15. Hoisting

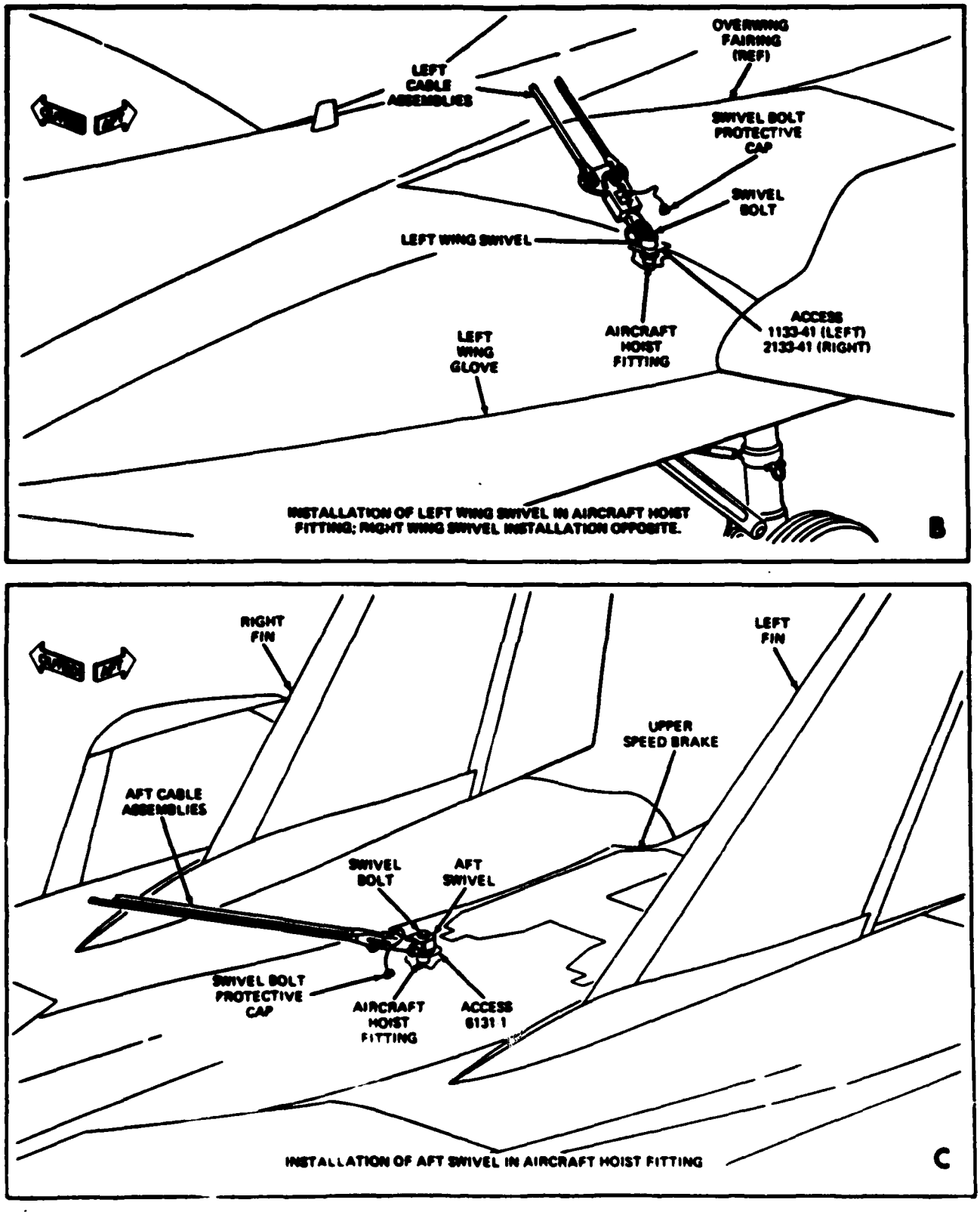
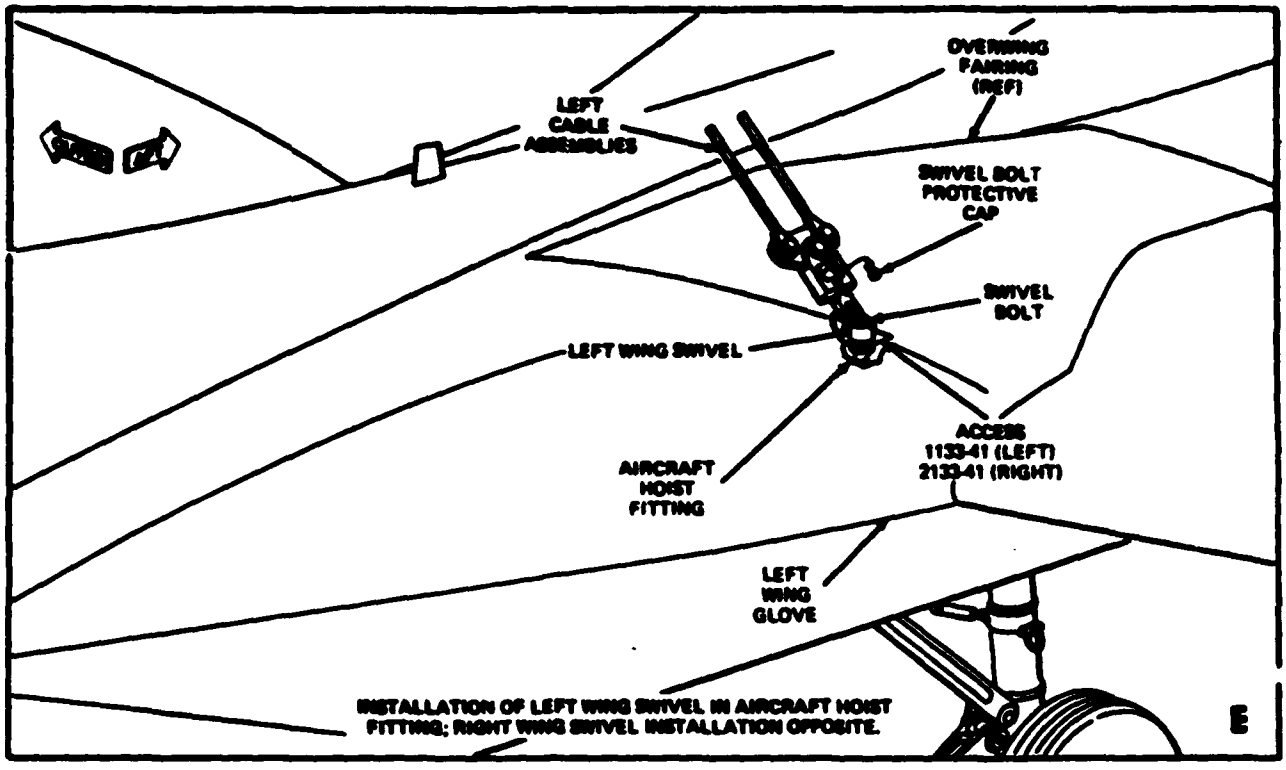


Figure 16. Hoisting



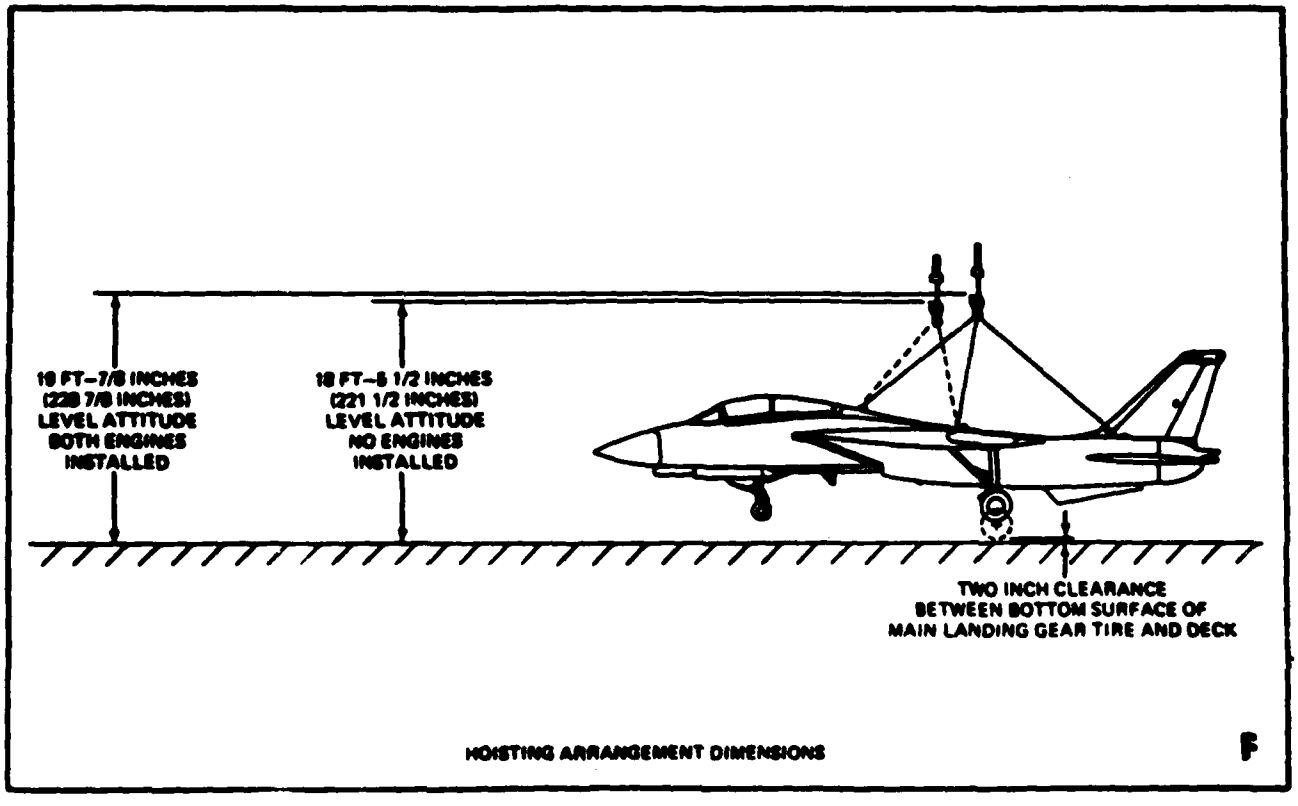


Figure 17. Hoisting

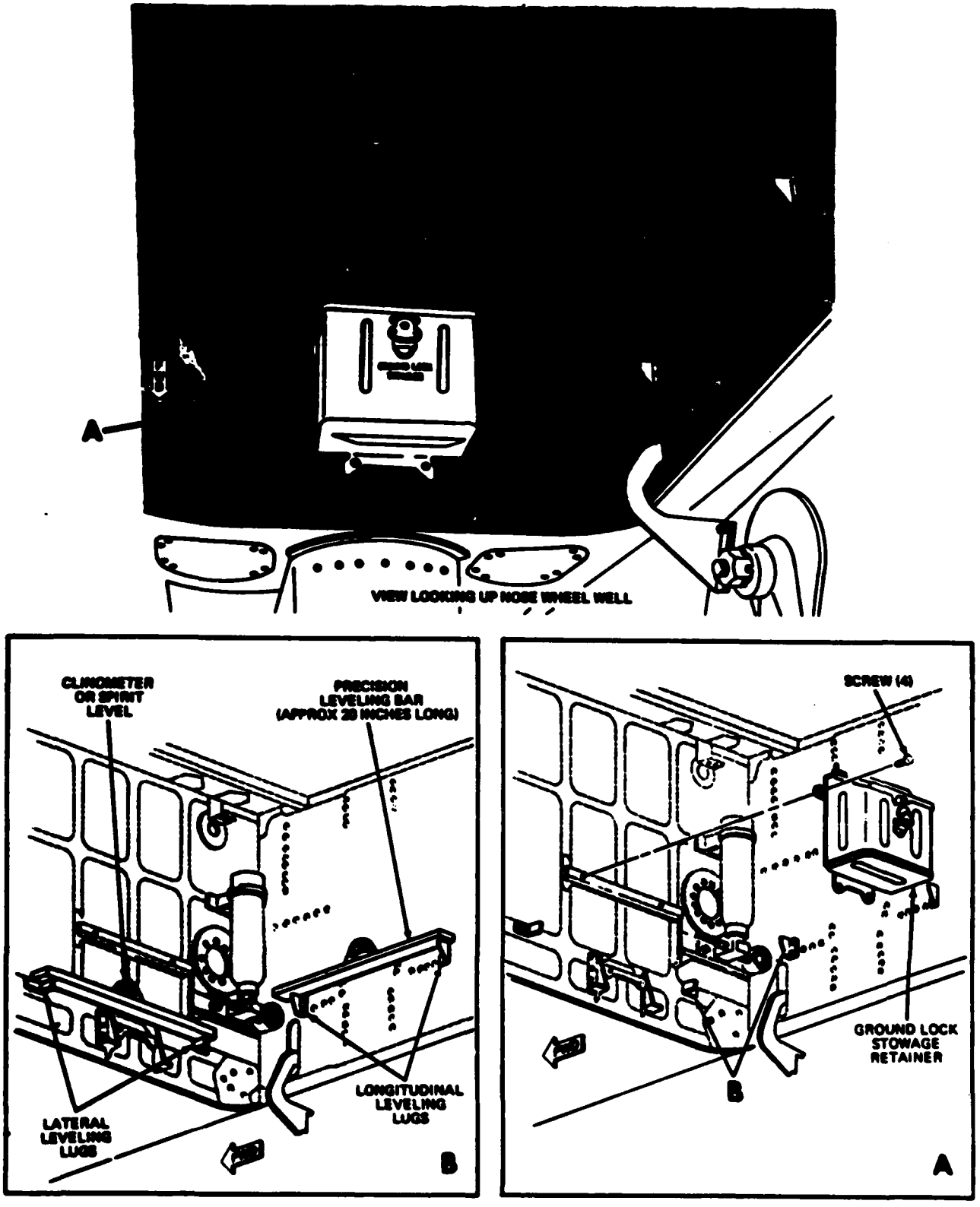


Figure 18. Leveling Points

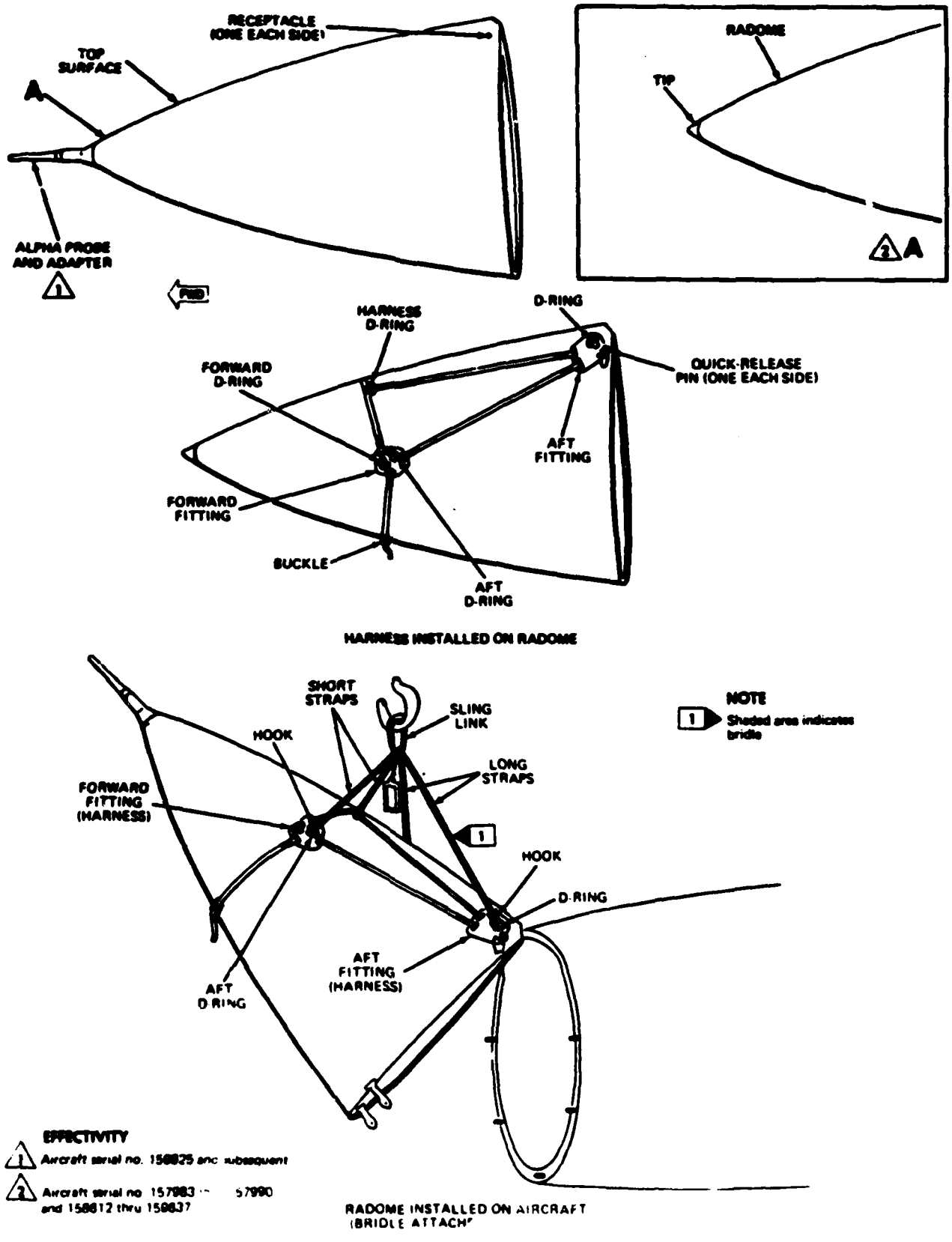


Figure 19. Radome Hoisting

RUNUP DANGER AREAS (EXHAUST JET WAKE-VELOCITY)

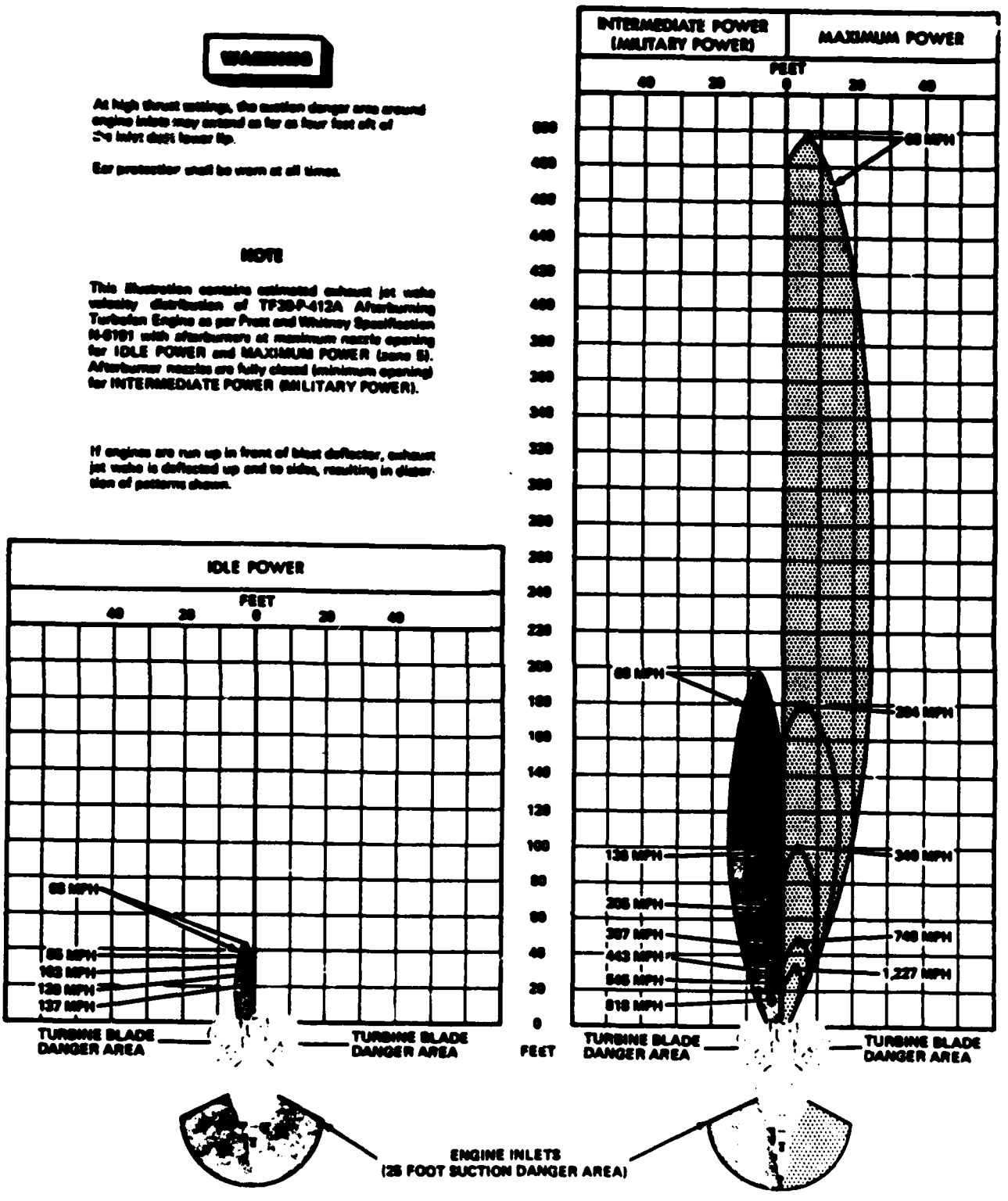
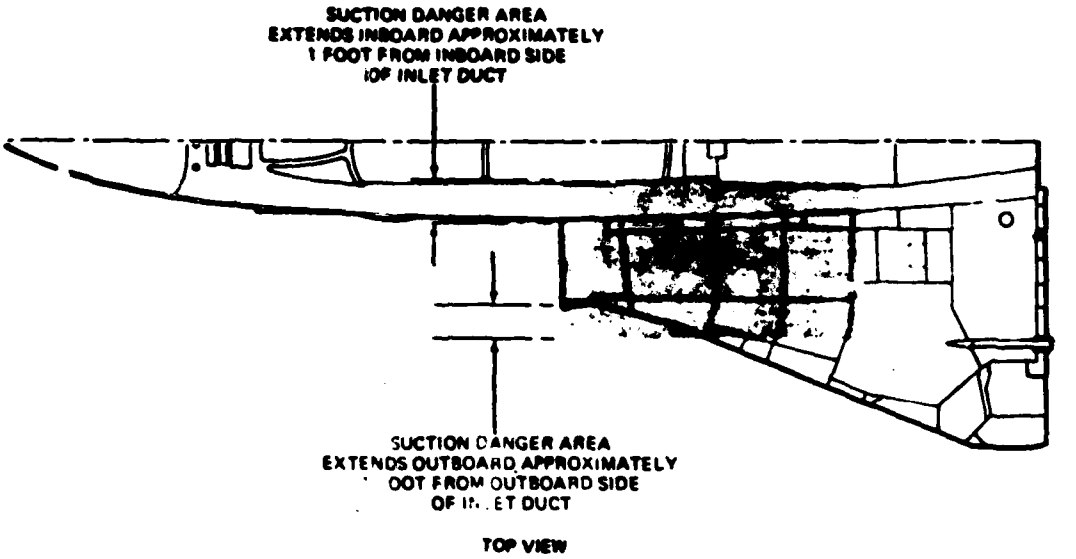


Figure 20. Engine Runup Danger Areas (Part 1 of 3)

ARMING/DEARMING SUCTION DANGER AREAS (IDLE POWER)



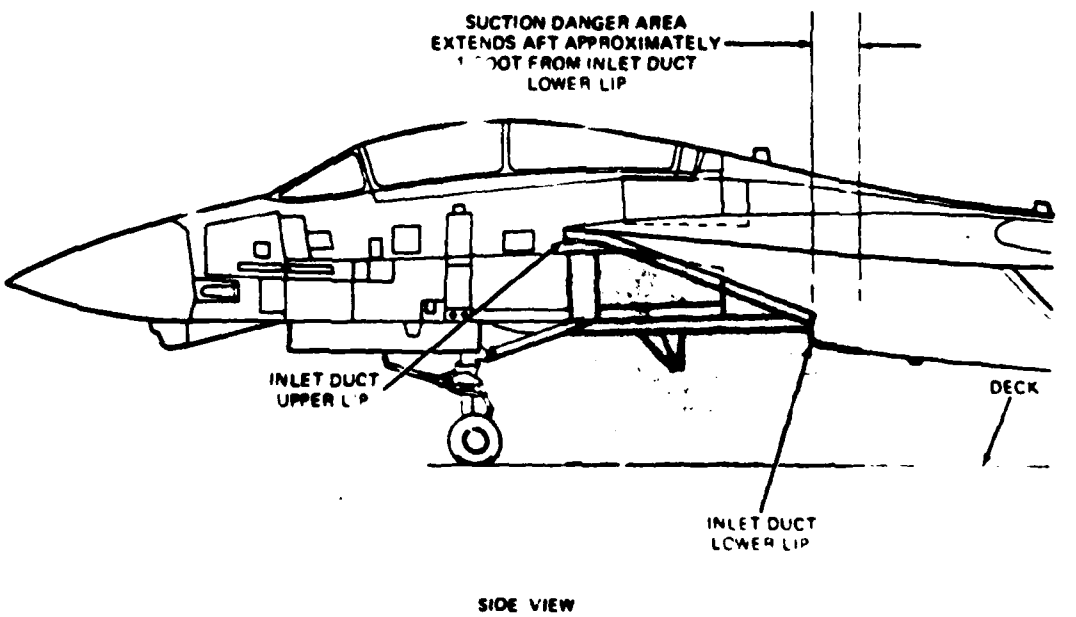


Figure 21. TF30-P412A Afterburning Turbofan Engine Runup Danger Areas (Part 2)

HAZARD ANALYSIS FORMS

The hazard analysis is contained in tabular form in the following pages, tables 2 through 9, of this section. The format for these forms is similar to that recommended for use in AFWL Regulation 127-1.

The following definitions for hazard classifications and validation are included here for general information:

1. Hazard Classification - This column provides a qualitative measure of significance for the potential effect of each identified hazardous condition, according to the following criteria:

   Class IV - SAFE - Condition(s) such that personnel error, deficiency/inadequacy of design, or malfunction will not produce equipment damage or personnel injury.

   Class III - MARGINAL - Condition(s) such that personnel error, deficiency/inadequacy of design, or malfunction will degrade performance, but which can be counteracted or controlled without major damage or injury to personnel.

   Class II - CRITICAL - Condition(s) such that personnel error, deficiency/inadequacy of design, or malfunction will degrade performance, injure personnel, damage equipment or will

result in a hazard requiring immediate corrective action for personnel or equipment survival.

Class I - CATASTROPHIC - Condition(s) such that personnel error, deficiency/inadequacy of design, or malfunction will severely degrade performance and cause subsequent equipment loss and/or death or multiple injuries to personnel.

2. Validation - This column is provided to record validated preventive measures and keep cognizant of the status of the recommended preventive measures, according to the following criteria: The column should be completed by resolving two questions:

   a. has the recommended solution been *incorporated, and*

   b. is the solution effective?

TABLE 2

AIRCRAFT (A/C) ARRIVAL DEPARTURE ACCOMMODATION

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITIONS	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS	ACCIDENT PREVENTION MEASURES: HARDWARE	ACCIDENT PREVENTION MEASURES: PROCEDURES	ACCIDENT PREVENTION MEASURES: PERSONNEL	VALIDATION
1a Ground handling, parking, servicing, transportation, of Aircraft	Aircraft	Aircraft in motion (towing)	Movement of heavy & large objects	(Similar to Column 3, event causing hazardous condition.)	Airplane Damage	Damage	II	Tow & Tow-bar Warning Vehicle(s)	USN Tech Manuals Coordinate with HPD O&M Contractor	Trained Personnel	
			Obstacles in path. Low traction surfaces		Personnel Injury/ Death	Injury/ Death	II or I		Path Clearance (Inspection)	Observers	
			Inclement Weather (Rain/ Winds & Poor Visibility						Path Clearance (Inspection) Safety Criteria Meteorological data and Forecast		
SUBSYSTEM OR FUNCTION: A/C Arrival/Departure Accommodation											
1b Parking @ HPD Site of Aircraft (A/C)	Unsecured nearby objects or A/C moving.	Weather (Winds)	Movement of objects colliding with A/C	(Similar to Column 3)	Airplane Damage	Damage	II	Tie-down provisions available (Wheel Chocks)	Safety Criteria & Inspection	Checklists Observance	
Parking (A/C) (Secure & Safe)	Power Cart, Work Stands (etc.)	Weather (Winds)	Movement of cart colliding with A/C	(Similar to Column 3)	Airplane Damage	Damage	II	Tie-down provisions available (Wheel Chocks)	Safety Criteria & Inspection	Checklists Observance	
	Elect. Power Connections	Improper (unsafe) Connection	Electric shock	(Similar to Column 3)	Personnel Injury/ Death	Injury/ Death	II or I	Power Cart, A/C Power Jack	USN Tech Manuals	Checklist Observance	
A/C Interior	Heat	Weather-lack of AC, lack of venting	Hot equipment. Personnel Uncomfort	(Similar to Column 3)	Personnel Exhaustion	Discomfort	III or II	AC Open A/C Doors		General requirements: Watches and rings removed. Safety shoes Two-man policy	

TABLE 2 (Continued)

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITIONS	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS	ACCIDENT PREVENTION MEASURES: HARDWARE	ACCIDENT PREVENTION MEASURES: PROCEDURES	ACCIDENT PREVENTION MEASURES: PERSONNEL	VALIDATION
1c A/C Flyaway	A/C	A/C in Flight	Electrical Fire (Improper Elec. Connect.)	(Same as Column 3)	Aircraft Loss	Loss	I		Flyaway Preps. & Funct. Test USN Tech Manuals	Trained Personnel	
					Personnel Death	Death	I				
A/C Taxing	A/C Wheels	A/C Take-Off	Poor Wheel Condition	(Same as Column 3)	Aircraft Damage	Damage or Loss	I	Spare Tires, etc.	Wheel Inspection (Pre-Fit. Checklists)	Trained Personnel	
					Personnel Death	Injury or Death	I				
					SUBSYSTEM OR FUNCTION: Aircraft Arrival/Parking						
1d A/C Parking	A/C	Inclement Weather (Lightning)	A/C & Personnel exposed to lightning stroke/high voltage	(Same as Column 3)	Aircraft Damage	Damage	II	Lightning Protection Devices	USN Tech Manuals		
					Personnel Injury/ Death	Injury	I	Grounding Provisions			
			Conducting Path between A/C & Personnel A/C Damage					(Nearby Tall Objects Provide Protection)			
					SUBSYSTEM OR FUNCTION: A/C Transportation (Towing)						
2a A/C Transportation	Aircraft	Aircraft in Motion (towing)	Movement of heavy & large objects	(Same as Column 3)	Aircraft Damage	Damage	II	Similar to A/C transportation during arrival			
					Personnel Injury or Death	Injury/ Death	II				
Into HPD				(Same as Column 3)	Personnel Injury or Death	Injury/ Death	II	(Including Albq. Coordination)			
								(Traffic Control of Trestle Vehicles)			
				Same as Column 3)	Per. Inj. or Death	Injury/ Death	II				

TABLE 3

AIRCRAFT INTO HPD FACILITY

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITIONS	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS.	ACCIDENT PREVENTION MEASURES			VALIDATION
								HARDWARE	PROCEDURES	PERSONNEL	
2b A/C Into HPD	A/C	A/C In Motion	Insuffi- Clearance	(Same as Column 3)	Aircraft Damage	Damage	II		Coordination with HPD O&M Contractor		
			Failure to Stop Collisions Working Volume Not Clear Tow-way Not Clear		Personnel Injury/ Death	Injury/ Death	II or I		Traffic Control of Trestle Vehicles		
						SUBSYSTEM OR FUNCTION:		A/C into HPD			
2c A/C Into HPD (Parking)	A/C	Parking Position Maneuver	Nearby Objects-Collisions	(Same as Column 3)	Aircraft Damage	Damage	II		Warning No Pulser Firing Allowed		
			Insufficient Clearance, e.g., DASET Van, S[illegible] (high, mobile sensor support stand,		Personnel Injury/ Death	Injury/ Death	II or I				

TABLE 4

AIRCRAFT INTO VPD (BACKUP TEST FACILITY)

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITION	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS	ACCIDENT PREVENTION MEASURES: HARDWARE	ACCIDENT PREVENTION MEASURES: PROCEDURES	ACCIDENT PREVENTION MEASURES: PERSONNEL	VALIDATION
2d A/C into VPD (If required) Transportation Parking Site-to-Site - HPD to VPD into VPD	A/C	A/C Motion A/C Maneuver	Uncontrolled Motion (Collisions	(Same as Column 3)	Aircraft Damage Personnel injury or Death	Damage Injury or Death	II II or I		Similar to A/C Transportation to HPD. Similar to A/C Parking at HPD when A/C arrives.		
						SUBSYSTEM OR FUNCTION:		A/C Maintenance			
3a A/C Equip. Functional Checks	Lightning or EMP Pulsing				Personnel Injury/ Death	Injury/ Death	II or I	(Fire Extinguishers)	Safe Area selected for function/Mode		
	Static Electricity	(Inclement Weather)		(Same as Column 3)	Aircraft Damage Personnel	Damage Injury	II II or I	Insure good grounds	Meteorological Data & Forecast	With respect to all operations, check grounding procedures.	
						SUBSYSTEM OR FUNCTION:		A/C Maintenance			
3b Functional Checks of A/C Equipment	Onboard high electrical power (AC Generators)	Onboard AC Generators Operating	Personnel Electric Shock						Trained Personnel onboard only. (First Aid Practice)		
	Engine (Fire)	Engine Malfunction	Engine Fire, Fuel Leaks	(Same as Column 3)	Aircraft Damage or Loss	Damage or Loss	II or I	Fire Extinguishers	USN Tech Manuals	A/C Observation during engine runs	
	Engine	Engine Runs	Noise Jet Wash, Debris						Safety Criteria Adherence		

TABLE 5

AIRCRAFT MAINTENANCE

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITIONS	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS.	ACCIDENT PREVENTION MEASURES			VALIDATION
								HARDWARE	PROCEDURES	PERSONNEL	
3c											
*Mission Onboard Equipment Functionally Checked Using Power Cart	Inerting A/C Fuel, identical to same function listed under Test Preps Sheet 4a)										
4a A/C Preps for EMP Testing (Parked @ HPD)	Inerting A/C Fuel System	High Pressure N_2	High Pressure System Operation	(Same as Column 3)	Personnel Injury/ Death	Injury or Death	II or I	F-14 Std. Support Equipment	USN Tech Manuals	Trained Personnel	
		Lightning or EMP Pulsing (Sparks)	Fire or Explosion		Aircraft Damage	Damage	II		Restricted Area During Operation		
		Warning N_2 Pressure in Fuel Tanks Must be Within + 3 psi of ambient or bladder failure is imminent							Meteorological Data & Forecast		
									Pulser Silence		
Personnel Familiarization & "Inspection" of A/C Session (External & Interior)	Personnel Unfamiliar with A/C	Ignorance of "Do's" & Don'ts"	Accessing or stepping on A/C where not permitted	(Same as Column 3)	Personnel Injury	Injury	II	F-14 support equip awareness by Test Personnel	Tech Manuals or generate special procedures	Session conducted by TAC personnel	
					Aircraft Damage	Damage					
4b											
Test Points Identification & Marking	Black Boxes, Cables, Connections, Equipment Tracks or Bays Crypto Gear Sensitivity Mission Equip. vs. Fit Equip.	"Breaking" Connections	Improper re-connections	(Same as Column 3)	Equipment Damage or Temporary Loss	Damage	II		Test Plan Test Procedures		
		Careless Handling							Priorities Test Configs. Log Maint.		

SUBSYSTEM OR FUNCTION: A/C Test Preps

TABLE 6

TESTING (SRF) (BACKUP FACILITY)

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITIONS	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS	ACCIDENT PREVENTION MEASURES			VALIDATION
								HARDWARE	PROCEDURES	PERSONNEL	
Se Test Ops. (VPD/SRF)	General: Similar to HPD Safety Requirements	Raising and Lowering of SRF Pulser									

TABLE 7

AIRCRAFT TEST PREPS

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITIONS	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS.	ACCIDENT PREVENTION MEASURES			VALIDATION
								HARDWARE	PROCEDURES	PERSONNEL	
c Instrumentation Installations & Checkout	Sensors, cabling, (routing)	Multi-installations		(Same as Column 3)	Personnel Injury	Injury		Test Hardware Availability	Test Plan Test Procedures	Experienced Test Personnel	
	Remote Atten. Microwave Transmitters		Excessive Heights		Equipment Damage	Damage	III	Onboard Lighting	Setups Priorities		
A/C Functional Power-On Checks (Power Cart)	Unused Cables Stowed/Secured			(Same as Column 3)	Personnel Injury	Injury	II	Flash-Lights Work-Stands	Instrum. Cables F-14 Cables;		
	DWG & Pneumatic Lines Others - Shielding & Grounding		Electrical Power Distributed Inside A/C		Equipment Damage	Damage	III	Access Platforms High Ranger Forklift with Pallet	Cables placed & Taped-Down Sensor Stability		
					SUBSYSTEM OR FUNCTION: Testing (HPD						
a Test Operations (Pulser Operating)	EMP Radiation	*Pulser Firing* Personnel In Work Volume Inadvertent Pulser Firing	Personnel Exposure Equipment Exposed & Not Ready For Exposure	(Same as Column 3)	Personnel Injury Equipment Damage	Injury Damage	II III	Warning Lites Warning Siren Radio & PA Closed Circuit TV	Safety Procedures & O&M Contractor Coordination Test Personnel Total Interfacing		
	High Voltage High Current	Personnel Contact with A/C or Equip.	(Electric Shock)	(Same as Column 3)	Personnel Injury/ Death	Injury/ Death	II or I				
Pulser System Maintenance	High Voltage (charging)	Pulser Syst not Safe or Personnel Access not controlled	Personnel Contact (Electric Shock)	(Same as Column 3)	Personnel Injury	Injury	II	Radio & PA Radio & PA Radio & PA	Req'd Personnel Coordination Safety Criteria/ Procedures		
Aircraft EMP Exposure	Suffocating Gasses	Engine Fire Extinguisher Squibs Initiated by EMP	Suffocation	(Same as Column 3)	Exposure to Fire Extinguisher Agent	Injury/ Death	II or I	Squibs Tested in Direct Drive Laboratory	Stay clear of Gas Cloud until dissipated.		
Canopy Removal	Explosives	Canopy Ejection System	Detonation	(Same as Column 3)	Personnel Injury/ Death	Injury/ Death	I or II	Warning Lites	AF Tech Order		

TABLE 8

TESTING (HPD)

MODE	HAZARDOUS ELEMENT	EVENT CAUSING HAZARDOUS CONDITIONS	HAZARDOUS CONDITION	EVENT CAUSING POTENTIAL ACCIDENT	POTENTIAL ACCIDENT	EFFECT	HAZARD CLASS.	ACCIDENT PREVENTION MEASURES: HARDWARE	ACCIDENT PREVENTION MEASURES: PROCEDURES	ACCIDENT PREVENTION MEASURES: PERSONNEL	VALIDATION
5b Test Operations (Pulser Operating)	High Voltage High Current	Pulser Firing & Charging	Personnel near HPD Ant Terminations or Pulser C & I Van	(Same as Column 3)	Personnel Death	Death	I	Warning Lites & Siren Commo (PA)	Safety Procedures	Surveillance of working Vol by Test Personnel	
Fuel Truck for Site's Generators (DASET, Antenna Lowering & Raising)	Loading Fuel	Inadvertent Pulser Firing	Fire and Explosion	(Same as Column 3)	Personnel Injury/ Death	Injury/ Death	II or I	Fire extinguishers available.	Safety Procedures	Qualified Personnel	
Base Munitions Transportation	EMP Radiation	Pulser Firing (Base Explosion) (Munitions)	Base "Hold" Ignored	(Same as Column 3)	Personnel Injury	Injury	II				
					SUBSYSTEM OR FUNCTION:			Testing (HPD)			
5c Test Operations	HPD Pulser/ Antenna System	Lowering & Raising of System	Personnel near or under system	(Same as Column 3)	Personnel Injury/ Death	Injury or Death	II or I	Support cables safety checked.	Safety Procedures		
			A/C not clear		Aircraft Damage	Damage	II				
Test Operations	A/C	Changing Sensors & Instrum.	Excessive heights	(Same as Column 3)	Personnel Injury/ Death	Injury or Death	II or I	Workstands Restraints Hard Hats Safety Shoes	Safety Proc. & Criteria Safety Criteria		
	Tools & Equip Used (in high places)	Tools & Equip in high places	Falling ojbects								
					SUBSYSTEM OR FUNCTION:			Testing (HPD)			
5d Test Contractor (Test Ops)	Lack of Accident Response	Slow Response	Untimely Manner of Response	(Same as Column 3)	Personnel Death	Death	I	First Aid Station on Site	Safety Help Provisions (Hospital Accommodation & Safety Procedures Pre-Coordinated.)		
Test Operations	Hydraulic Lines	Forklift Loose Channels	Swinging Lines Hydrofluid on Personn Personnel	(Same as Column 3)	Personnel Injury	Injury	II	Clearly Marked	Safety Procedures	Surveillance of Working Vol. by Test Personnel	

SECTION 6

SAFETY PROGRAM

This section of the document presents the recommended program for achieving a safe test effort during the F-14 test program. The following paragraphs address the concepts of appointing a Safety Officer, the use of safety procedures, area signs, controlled access to the test area, safety equipment, personnel training, and other associated safety considerations.

6-1 SAFETY ORGANIZATION

Fundamental to a responsive and responsible safety program is implementation of the concept that anyone who detects an unsafe condition, no matter how seemingly trivial, has the responsibility to alert the rest of the test team and immediately stop all test operations. Ultimate responsibility for insuring safety throughout the program resides in the Test Director. Responsibility for implementation of all safety measures on-site resides in the Test Operations Director. Authority for implementation of safety procedures to include resort of test operations after an unsafe condition has been detected has been functionally divided into aircraft operations and test technical operations. For the System-level test, aircraft operations safety is within the authority of the Grumman Project Coordinator and test technical operations safety within the authority of the AFWL Test Operations Director as shown in Figure 22.

6-2 SAFETY PROCEDURES

Procedures to assure safe operations for the F-14 assessment program fall into two categories:

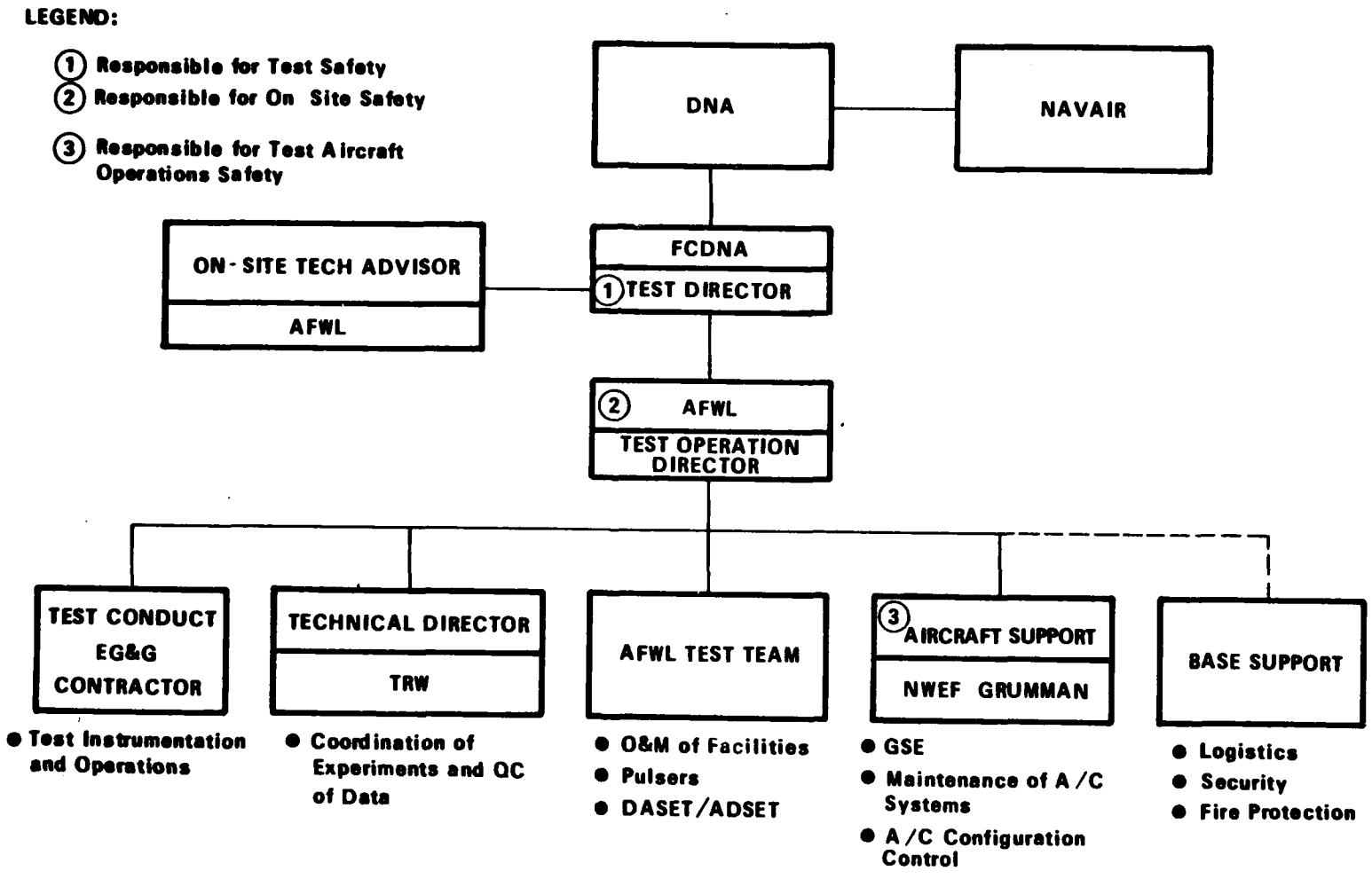


Figure 22. F-14 Test Conduct Organization

1. Normal site safety procedures, and

2. Procedures unique to the test operations.

The normal site safety procedures are delineated. These procedures will continue in force during this test program. Rather than reiterate these procedures in this document, they are incorporated herein by reference. Pertinent considerations for incorporation into the procedures by the site operations and/or test contractor are listed below:

1. Use of physical barriers such as safety ropes, fences, etc., to limit personnel access into hazardous areas.

2. Establishing a precise limit on the number of personnel allowed into the hazardous area.

3. Establishment of precise locations for personnel required in the hazardous area.

Procedures will also be in effect for:

1. Controlling general personnel access to the facility from a safety standpoint.

2. Controlling personnel access to the site and in the site working volume during the pulser firing operations.

3. Safety equipment required for each phase of the operation will be made available and proper instructions will be issued to all test personnel.

4. Periodic checkout of safety equipment will be made.

6-3 AREA SIGNS

All hazardous areas require proper marking and identification so that personnel not familiar with the hazards

in the area are made aware of the dangers. General guidelines for this type of activity are contained in both AFR 127-101 and OSHA. A detailed discussion, therefore, of area posting requirements will not be repeated in these recommendations.

6-4 ACCESS TO AREA

As a by-product of the security requirements of the test sites, personnel access is limited to those people who have a definite need to be in the area. This will aid the safety considerations by limiting the number of people in the working areas. During times of hazardous operations, the Test Operations Director or his delegate will have complete control over the operations on the site and of acces to the working areas. This officer will be able to suspend or terminate any test activity at his sole discretion if, in his judgement, safety is being compromised.

Any visitors wishing to go within the controlled test area must clear with the Test Director (or his delegate) prior to entering.

6-5 SAFETY EQUIPMENT

The Safety equipment which is necessary on the site is divided into three classes:

1. First-aid equipment.
2. Personal safety gear.
3. Special safety equipment.

Adequate first-aid equipment currently is in existence at the sites, and site personnel are trained in first-aid techniques.

Individuals performing hazardous operations, such as working on and around the test stands, will be required to use proper safety equipment designed to minimize hazards. In this category are hard hats, safety shoes (with non-skid soles), and safety glasses or goggles where applicable. Contractors and Air Force organizations which have personnel operating on the site will provide safety equipment for their personnel.

6-6 PERSONNEL SAFETY BRIEFING

Safety procedures are effective only if they are adhered to. It is mandatory that all personnel involved in day-to-day operations on the test site be briefed in two areas:

1. Performing their daily tasks, in a safe manner.
2. Responding to an accident in a proper manner.

Personnel working at the test site will be trained in all elements of safe site operations. Items to be stressed are:

1. Strict compliance to the safety directions.
2. Careful adherence to safety procedures for hazardous operations.
3. Obeying all warning signs in the work area.
4. Continually examining the test site and test operations for potentially dangerous activities and conditions.

It is to be stressed that being "safety conscious" is each individual's responsibility at all times, not just the responsibility of the Safety Officers.

In addition, selected site and contractor personnel have been trained in areas of first-aid, safety inspections, and the proper utilization of special safety equipment. The number

of people trained in this area is not large, but it is necessary that at all times at least one person who is well qualified in the area of first-aid be physically present at the test site.

6-7 STANDARD OPERATIONS

Standard operations procedures that have been established will be utilized at the test sites, especially in the following areas: operations and maintenance, protective equipment, housekeeping, lighting, and general safety practices. Under general safety practices are restrictions concerning clothing, watches and rings, intoxicants, tampering with equipment, personal conduct, electrical repairs, railings and toe boards, and the use and storage of hazardous material and equipment.

6-8 SUMMARY

This section has presented the recommended safety program for the F-14 test. The program primarily consists of four major elements:

1. The designation of a Safety Team with complete safety authority on the test site.
2. The establishment and implementation of safety procedures for normal site operations, and hazardous test preparation and testing operations.
3. The acquisition and proper utilization of required safety equipment including first-aid equipment, personal safety equipment, and such special safety equipment as may be required to minimize potential accidents.

4. Personnel briefings stressing day-to-day safety practices, and specialized training for designated personnel in the areas of first-aid.

Again, it is to be emphasized that the achievement of a safe test program does not result from a "one-shot" safety analysis. Rather, it is the result of continuing iterations between the various elements of the program, as the program progresses, and an examination of each of these elements in light of safety requirements. The test personnel associated with the program will review and, if necessary, revise the safety approach defined in this document as the changing and better defined constraints of this program dictate, including feedback from future operations.

REFERENCES

1. AFWL Regulation 127-1 "Safety," Air Force Weapons Laboratory, January 1973.

2. BDM Document BDM/A-128-75-TR, "HPD Facility Safety Analysis and Hazards Evaluation Report," 24 September 1975.

3. Air Force Regulation 127-101, "Industrial Safety Accident Prevention Handbook," 26 June 1970.

4. OSHA, "Occupational Safety and Health Standards," Federal Register, Volume 37, Number 202, Part II, 18 October 1972.

5. Air Force Regulation 127-12, "Air Force Occupational Safety and Health Program," 4 June 1976.

6. VPD II System Safety Plan (DRAFT), F29601-76-C-0049, March 1976.

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